10TH

Biennial Report

1962-1963

LOUISIANA
Wild Life and Fisheries Commission

10TH
BIENNIAL REPORT

Louisiana
Wild Life and
Fisheries Commission
1962-1963

Published by

Louisiana Wild Life and
Fisheries Commission

Wild Life and Fisheries Building
400 Royal Street
New Orleans, Louisiana 70130

FELLOW CITIZENS OF LOUISIANA

The two-year period covered by this report of the Louisiana Wild Life and Fisheries Commission reflects considerable progress during this administration.

A forward trend has been evident in many areas and phases of the management of Louisiana's wildlife resources. It is significant that some of the accomplishments not only will be beneficial to those who presently participate in out-of-doors activities, but will be available and improved for generations of the future.

Approximately 65,000 acres of prime wildlife habitat land was purchased in two tracts, both advantageously located;

New areas have been leased for fish and game management;

Lakes have been built in areas where the greatest need was evident.

Salaries for those in the scientific and management fields have been raised to be competitive with other agencies and states.

Enforcement agents now have opportunity for promotions and salary increases throughout the state.

Louisiana has attained number one position in America in the production of commercial fish, both saltwater and fresh water, fur, with particular note being placed on stepped-up research largely responsible for increased shrimp and oyster production.

Louisiana is bountifully blessed with natural resources. Its wildlife resources compare favorably or exceed that found in any of the fifty states. All of us have a real responsibility to manage these resources well, providing protection, production and the opportunity of utilization of the harvestable surplus by our people.

Public acceptance and acclaim of the program of the Wild Life and Fisheries Commission has been a real satisfaction to me as Governor of Louisiana.

Jimmie H. Davis

L. D. YOUNG, JR.
DIRECTOR
RICHARD K. YANCEY
ASSISTANT DIRECTOR

State of Louisiana
WILD LIFE AND FISHERIES COMMISSION
400 ROYAL STREET
NEW ORLEANS 16

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RAY WHATLEY
ALEXANDRIA

May 1, 1964

His Excellency, The Governor of Louisiana
The Honorable Members of the Legislature
State Capitol
Baton Rouge, Louisiana

Gentlemen:

The Louisiana Wild Life and Fisheries Commission is pleased to present to you and the people of our State its tenth Biennial Report covering the calendar years ending December 31, 1962 and December 31, 1963.

In presenting this program of progress in the wildlife resource field, the Wild Life and Fisheries Commission realizes that credit for these accomplishments must be shared with the Governor's Office, the Legislature, other State Agencies, news media, sportsmen's organizations, and many other organized groups and individuals who have volunteered such excellent assistance and cooperation.

I hereby take this opportunity to express for the Members of the Commission, its staff and myself our sincere appreciation for assistance in keeping Louisiana a "Sportsman's Paradise".

Very respectfully yours,

L D Young Jr

L. D. Young, Jr.,
Director

LOUISIANA WILD LIFE AND FISHERIES COMMISSION

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Chief, Oysters, Water Bottoms and Seafood

Harry Schafer
Dingell-Johnson Coordinator

Ted O'Neil
Chief, Fur Division

Robert LaFleur
Chief, Water Pollution Control

Roy B. Schaefer
Chief Accountant

Allan Ensminger
Chief, Refuge Division

LOUISIANA WILD LIFE AND FISHERIES COMMISSION

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Chairman

L. R. FLEMING
Vice-Chairman

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J. P. CRAIN

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Administration

PEAK ATTAINMENTS during the past two years in the management, preservation and utilization of Louisiana's wildlife resources should now be viewed only as a challenge to everyone to move progressively forward in the coming years.

The year 1963 brought a new high in outdoor recreation and productiveness of both commercial and sport wildlife and fisheries.

Louisiana is bountifully blessed with an abundance of wildlife resources, but new records in many phases of endeavors did not come about by mere chance. Many of the fish and wildlife management programs initiated over the years are now showing extremely successful results, and will continue in this trend so long as sound concepts and approaches are maintained.

There is definite evidence to back up the statement that present management practices put into operation by the commission have resulted in a record-smashing 1963 and offer almost unlimited promise for the future.

Hunters have had their best year in the state's history. This is particularly true of deer hunting. Using figures from the game management areas where public hunts were held between November 29 and December 3, the harvest was triple that of last year. There were 36,033 hunter efforts on those state-managed areas, with a total bag of 3,698 deer. This compares to 23,149 hunter efforts in 1962 and resulted in 1,352 deer being taken that year.

The average deer harvest per hunter effort was one deer bagged for each 10 hunts made. Since many hunters made 3 or 4 efforts the average success was approximately one deer taken for every six hunters. Deer hunting success outside of the game management areas was also excellent over the State as a whole.

This can be cited as one example of the role played by the Commission in management of deer and other forms of wildlife. It is also the gratifying result of more than a decade of live-trapping and transplanting.

During the past two years Louisiana has led the nation in the production of commercial fish.

The 1963 shrimp season was an exceptional one. Louisiana's total production was over 90 million pounds, heads-on weight. This made the year's production equal to the greatest year on record, putting Louisiana back in first place as the number one shrimp producing state.

Breakthroughs in shrimp research at the Commission's Grand Terre Marine Laboratory have been made in the past two years and now for the first time reasonable predictions of forthcoming annual yields can be determined. The same holds true as Louisiana maintains its position as the number one state in oyster production. These marine resources are of tremendous importance to Louisiana and fact finding research programs must be continued and if possible expanded for the benefit of these important industries.

L. D. YOUNG, JR.
Director

There was also a substantial increase in the value of the Louisiana fur harvest during the 1962-63 season. Approximately $2,428,267.00 was derived from the industry by trappers, greatly bolstering the economy of this segment of our wildlife resources.

During the past two years the Commission has carefully established all hunting regulations in a manner that would provide maximum outdoor opportunity for Louisiana sportsmen, while at the same time allowing the continuation and expansion of the state's wildlife populations. As a whole these regulations were better accepted by

R. K. YANCEY
Assistant Director

the people than at anytime in recent history.

The Commission led the fight in the Mississippi Flyway for more reasonable and realistic waterfowl hunting regulations. As a result the trend of more restrictive duck hunting regulations each year was finally reversed in 1963 when the bag limit was increased to 4 and season length to 35 days. But for the efforts of the Commission the sport of duck hunting would have probably been closed altogether to the future detriment of waterfowl populations, as well as over 100,000 duck hunters in the State. With the improved hunting regulations in 1963 duck stamp sales doubled over 1962 and Pelican State gunners enjoyed one of the best seasons since the mid-fifties.

Although much public attention was focused on the controversy over duck hunting regulations, equal consideration was given by the Commission to the proper setting of the deer, squirrel, quail, rabbit, dove, snipe, and woodcock seasons. As a result hunters throughout Louisiana have expressed more satisfaction than ever before.

The activities of the Louisiana Wild Life and Fisheries Commission are many, and in some instances, complex. However, there is little doubt that the year 1963 brought excellent public acceptance of many of the Commission's long-range programs and established a new high in wildlife and fisheries management.

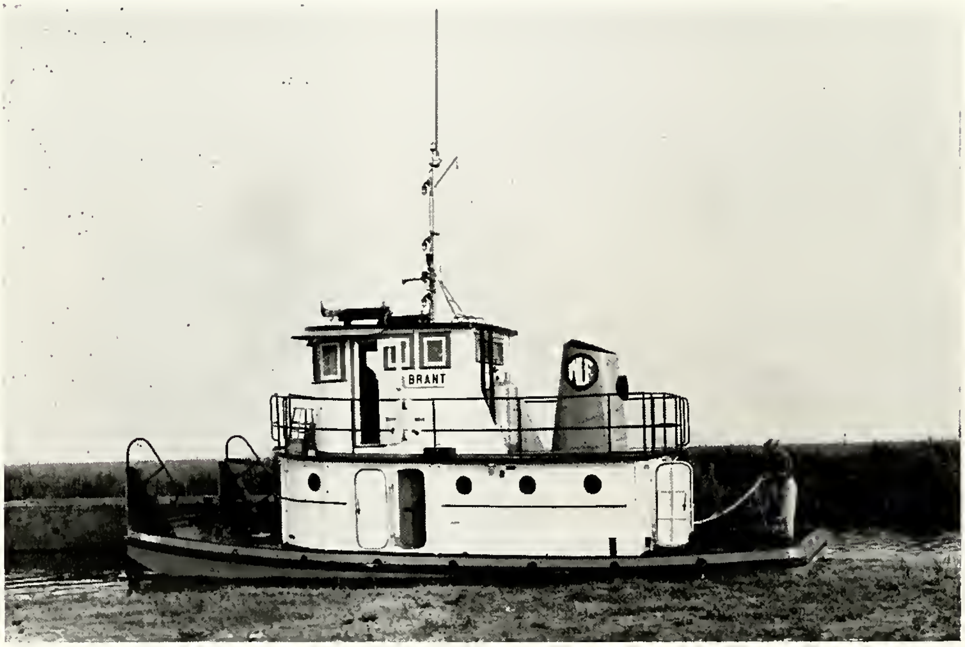
Our fish and game resources are faced with many future problems but these can be overcome by continuing an active and progressive research and management program. Demands for recreational opportunity outdoors are increasing tremendously and only through the development of access to public water bodies, increasing production of fish and game on existing areas, and acquisition of new lands for wildlife management purposes can these demands be met.

At the same time commercial interests dependent upon fish and wildlife resources must be given constant, alert and progressive attention. This important segment of Louisiana's economy must be enlarged, promoted and protected.

Acceptance of the Commission's overall program by the general public is best determined by the statewide spirit of cooperation now being evidenced daily.

The Commission looks back only to use past accomplishments as stepping stones to greater challenges in the years ahead.

Commission personnel, public officials and our citizenry have been forged into a team which is producing results. These accomplishments speak for themselves.



The Commission's lone tugboat "Brant" is used in the many canals that dot the 82,000 acre Rockefeller refuge in Cameron and Vermilion Parishes. The tug is used to tow barges loaded with materials and equipment utilized in maintaining the state-owned refuges.

Aviation Section

Use of aircraft is an important part of many activities of the Louisiana Wild Life and Fisheries Commission. Planes are valuable for research, enforcement, pollution prevention, aerial counting of waterfowl and other uses.

One of the many uses made of Commission-owned aircraft was in the live-trapping of more than 100 deer in just three days in 1963. In this operation, a light plane spotted the deer on state and federal refuges. Use of a helicopter, rented for the program, and an airboat, allowed the biologists engaged in the restocking program to capture the deer, transporting them by helicopter to waiting boats and trucks where they were conveyed to predetermined release areas and released to establish new deer herds.

This operation, called "deer lift," marked the first time that aircraft were used for this purpose. It established wildlife management history in that 104 wild deer were captured and relocated at an average cost of approximately $10 an animal.

Commission aircraft now play an important role in shrimp research. Sampling, which was once a time-consuming program involving boats and personnel, is now easily accomplished in a single day. The entire Louisiana coast can be sampled and the samples carefully examined by research biologists at the Commission marine laboratory. This allows the Commission to best determine the anticipated rate of development and harvest, and provides sound biological data to be utilized in setting the spring trawling season.

Use of aircraft allows the Commission's Enforcement Division to conduct aerial patrols, and to swiftly move additional agents into areas where enforcement operations are in progress.

The Louisiana Wild Life and Fisheries Commission established another "first" in 1963 when one of its aircraft pioneered sampling of shrimp along coastal checkpoints by use of a seaplane. The taxiing plane was able to pull a test trawl successfully thus allowing a complete sampling of the coast in a single day. Prior to this method of shrimp sampling, it took days for Commission boats to collect samples and transport them to the Marine Research Laboratory at Grand Terre Island. Use of aircraft greatly reduced overall cost and time involved in sampling by boats.

Commission planes are used for spotting river pollution sources and for aerial photography of industrial installations which could be sources of water pollution. Huge industrial complexes can be examined quickly from the air and correction or prevention of pollution can be handled more quickly by the Commission's Water Pollution Control Division.

The Wharf

CLAUDE LeBLANC
Superintendent

The Marine and Radio repair department of the Commission is located in New Orleans on the New Basin Canal, near Lake Pontchartrain. During the past two years this section has constantly worked in the maintenance and repair of all the Commission's watercraft.

One of its main problems of boat repair was solved in the past two years through the installation of a 25-ton crane for use in major haulouts. The new crane equipped with nylon belts has been able to lift large craft at the "WHARF" where they can readily be worked on by Commission personnel. This operation has, and will, contribute to a more efficient and economical operation of the Commission's boats.

The "WHARF" operates with a crew of 22 workmen and technicians who are on hand to do anything from a minor engine adjustment to a major "haul-out" and hull repair.

The addition of the stiffleg derrick has meant that craft up to fifty feet in length can be lifted for repairs. The boats are simply hoisted onto the docks, shorn up, and the workmen are able to begin their job with the "WHARF's" workshop facilities right at hand. This is a saving in time and labor.

Many pieces of equipment in need of servicing are brought in to the "WHARF". However, when it is less expensive, crews are sent out to effect repairs anywhere in the state. One of the best examples of this is the completely equipped radio repair van which conducts statewide, on the spot, repairs.

Recently a 170-foot radio tower was installed at the wharf to replace the old 90-foot one. This resulted in better communications and a clearer range of statewide transmission and reception. Remote control through the main office makes it possible to have constant communication with boats, planes and mobile units, throughout the state.

A new 25-ton crane, installed at the Wild Life and Fisheries Commission wharf in 1963 allows Commission personnel to lift large craft ashore where they can be serviced by state personnel. In the past, it was necessary for large craft to be sent to outside shipyards where facilities existed for handling them. This new addition to wharf equipment will greatly increase the efficiency of the wharf and result in financial savings to the Commission.

Purchasing for the field such as marine supplies for boats, radios, etc., is handled through the wharf. Other facilities at the wharf include an outboard motor shop which keeps 300 outboard motors in tip-top shape throughout the year and a radio repair shop which services an equal number of radios. Also there is a fully equipped carpenter shop and marine repair shop. Along with this a warehouse for stock parts and materials is maintained.

Superintendent of the wharf is Claude LeBlanc who has a background of many years of experience with the Commission and previously, while with the U. S. Army, in repair and maintenance, was known for his "trouble shooting" when things needed straightening out.

The all new "Marine Research" is equipped with modern facilities and tools and is used by the Oysters, Waterbottoms and Seafood Division for oyster and shrimp research in the Gulf of Mexico and its many bays, bayous and inlets along the Louisiana coast.

Accounting Section

ROY B. SCHAEFER
Chief Accountant

It is through the following complex statements, showing a maze of figures, that a visible insight into our Commission's financial status can be seen. These statements not only support our past activities but endeavor to show the needs for requesting future monies; for without sufficient appropriations our programs could not be accomplished. Sound financing is essential and is the only basis for promoting any program of value. During the past two years many improvements have been realized with the use of our I.B.M. equipment. The results of these applications have been equally satisfying, making possible the acquisition of valuable management data which was virtually impossible to obtain under the previous manual system.

Annually some $7,000,000 of revenue must be controlled and effectively collected. Our commission is self-supporting and does not receive any appropriation from the General Fund of the State. These revenues are not only properly allocated to the various dedicated funds but are also controlled by class of revenue. Such an application controlled on a daily basis enables us to scan all sources of income for maximum collection and take corrective measures as needed. This has brought about a welcome increase in our revenues. You will note such increases in Exhibit 4 as over $75,000 in Sports licenses, over $61,000 trawl-vessel licenses and over-all increases in all major categories. This trend is expected to increases in the future as the 1963-64 estimate shows.

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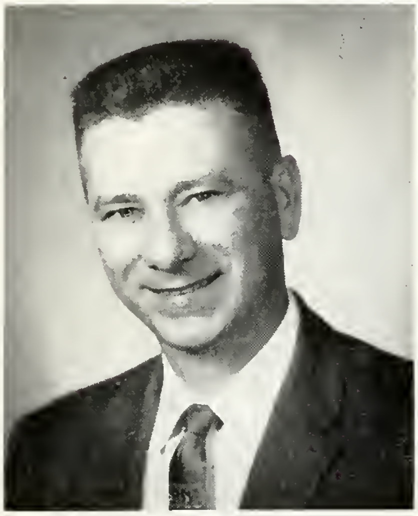
78,000 invoices from all parts of the State are paid annually. The manual handling and matching of invoices with purchase orders becomes necessarily involved to assure proper ver-

LAWRENCE H. COOK
Accountant



ROY B. SCHAEFER
Chief Accountant

ROGER HUNTER
Supervisor of Revenue

ification and coding of all expenditures prior to I.B.M. processing. The I.B.M. system is used to pay these invoices and distribute expenses to the various funds, divisions and expense classifications. There are thirteen separate divisions with a possible fifty different expense classifications within each division. Prompt payment of some 18,000 checks annually to vendors is accomplished as a matter of routine under our system. As a by-product of this operation, cards are machine punched automatically as the checks are run for use in bank statement reconciliation.

Refinements have been made in motor boat registration and the 3 year renewal in progress is being efficiently accomplished on a quarterly schedule with 13,000 notices being mailed each quarter. A renewal notice is sent to each registered owner prior to expiration of his existing certificate of number. Certificates are I.B.M. processed as renewal notices are returned by applicants and the I.B.M. cards are used for future control and statistical data as shown in Exhibit 23. This report is required semi-annually by the Federal Government.

The broadening activities of the Louisiana Wild Life and Fisheries Commission, endeavoring to meet expanding demands of both commercial and recreational interest and a more detailed and controlled budget, have placed additional tasks and responsibilities on our accounting personnel. It is through the devotion and loyalty of our employees that these demands have been met without diverting additional funds which are so greatly needed to meet public demands in our diversified conservation program. As shown in Exhibits 5 and 6, only 6 or 7% of total expenditures are for Administration.

Exhibit 1

LOUISIANA WILD LIFE AND FISHERIES COMMISSION BALANCE SHEET

June 30, 1963

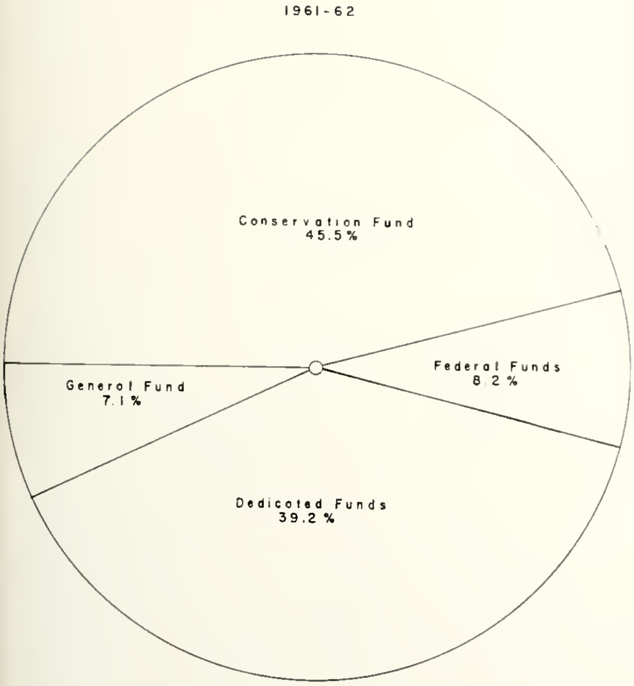
	ASSETS			LIABILITIES		
	Cash	*Accounts Receivable*	*Total Assets*	*Accounts Payable*	*Surplus*	*Total Liabilities & Surplus*
Conservation Fund	$ 2,517,856.97	$ 115,752.70	$ 2,633,609.67	$ 327,695.79	$ 2,305,913.88	$ 2,633,609.67
Rockefeller Fund	6,832,621.39	....	6,832,621.39	381,271.50	6,451,349.89	6,832,621.39
Oyster Seed Ground Fund	434,067.19	....	434,067.19	49,881.29	384,185.90	434,067.19
Commercial Seafood Fund	513,523.59	....	513,523.59	98,950.54	414,573.05	513,523.59
Marsh Island Fund	1,978,411.25	....	1,978,411.25	451.64	1,977,959.61	1,978,411.25
Seismic Fund	344,612.44	36,240.00	380,852.44	....	380,852.44	380,852.44
Ward McIlhenny Fund	3,861.55	....	3,861.55	....	3,861.55	3,861.55
Bodcau Game Mgmt. Fund	991.72	....	991.72	991.72	....	991.72
Bayou Lamoque Fund	4,218.54	....	4,218.54	4,218.54	....	4,218.54
General Fund	1,196.99	....	1,196.99	....	1,196.99	1,196.99
Boat Ramp Fund	40,000.00	....	40,000.00	....	40,000.00	40,000.00
TOTAL	$12,671,361.63	$ 151,992.70	$12,823,354.33	$ 863,461.02	$11,959,893.31	$12,823,354.33

This sleek watercraft, the "Bluegill II", is capable of doing 25 miles per hour and is used mostly in the Mississippi River by the Water Pollution Control Division.

Exhibit 2

APPROPRIATIONS

	1961-62 Actual	*1962-63 Actual*	*1963-64 Budget*
CONSERVATION FUND:			
General Operations	$2,684,651.00	$2,943,927.00	$3,468,873.00
FEDERAL FUNDS:			
Pittman-Robertson	257,879.47	249,109.13	270,000.00
Dingell-Johnson	45,254.19	27,550.55	30,000.00
Hyacinth Control	110,048.40	118,022.02	60,000.00
Water Pollution Control	70,318.00	74,512.62	50,000.00
DEDICATED FUNDS:			
Rockefeller	1,088,928.00	543,678.00	1,002,000.00
Oyster Seed Grounds	487,598.16	343,669.00	350,000.00
Commercial Seafood	590,121.32	344,412.00	400,000.00
Marsh Island	149,167.00	127,113.00	182,000.00
GENERAL FUNDS:			
Building	105,000.00	....	....
Hyacinth Control	244,986.00	....	....
Board of Liquidation—Trappers	60,000.00	....	....
TOTAL	$5,893,951.54	$4,771,993.32	$5,812,873.00



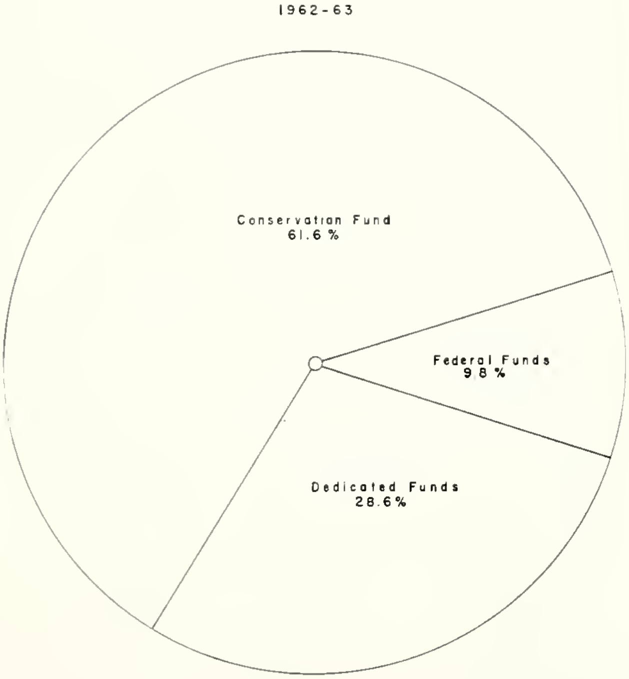


Exhibit 3

EXPENDITURES AND BUDGET BY FUNDS AND DIVISIONS

	1961-62 Actual	*1962-63 Actual*	*1963-64 Budget*
Administrative	$ 342,141.61	$ 354,544.37	$ 289,631.00
Education & Publicity	307,979.45	124,871.58	182,714.00
Water Pollution Control	148,134.16	127,562.14	157,606.00
Enforcement	1,278,848.68	1,372,384.11	1,544,419.00
Fish & Game	542,070.71	603,709.68	1,120,247.00
Fur	27,690.44	31,084.57	31,770.00
Pittman-Robertson	343,839.29	332,145.51	...........*
Dingell-Johnson	63,384.37	38,181.62	...........*
Rockefeller Refuge	934,265.00	470,320.88	1,002,000.00
Oyster Seed Grounds	477,598.16	320,105.15	350,000.00
Commercial Seafood	411,621.32	258,399.82	400,000.00
Hyacinth Control	341,401.38	347,070.36	394,280.00
Marsh Island	149,167.00	121,667.68	230,631.00
Building	102,695.62	101,093.00	109,575.00
TOTAL	$5,470,837.19	$4,603,140.47	$5,812,873.00

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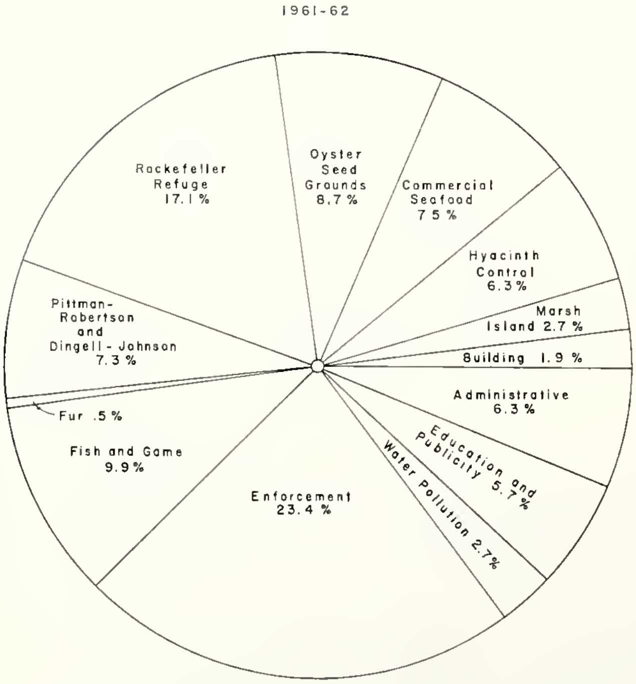
*Included in Fish & Game Budget.



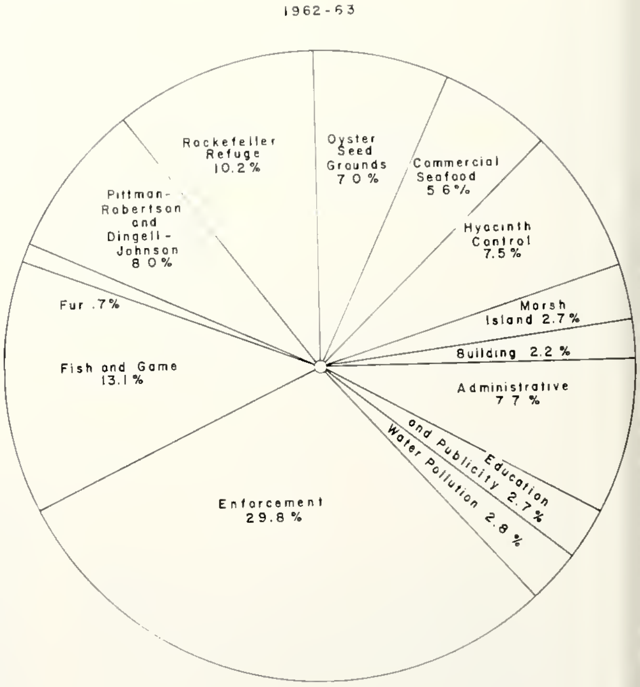


Exhibit 4

ALL RECEIPTS
CONSERVATION FUND, DEDICATED FUNDS AND FEDERAL FUNDS
ACTUAL RECEIPTS 1961-62 AND 1962-63
ESTIMATED RECEIPTS 1963-64

CONSERVATION FUND	*Actual 1961-62*	*Actual 1962-63*	*Estimated 1963-64*
Sport Licenses:			
Fishing-New Orleans	$ 27,001.00	$ 32,294.00	$ 35,000.00
Fishing-Other Parishes	208,569.73	215,464.22	220,000.00
Total Fishing	$ 235,570.73	$ 247,758.22	$ 255,000.00
Hunting-New Orleans	$ 25,507.00	$ 25,643.00	$ 26,000.00
Hunting-Other Parishes	536,827.52	600,038.39	650,000.00
Total Hunting	$ 562,334.52	$ 625,681.39	$ 676,000.00
Total Sport Licenses	$ 797,905.25	$ 873,439.61	$ 931,000.00
Commercial Fishing & Dealers: (Includes Fish, Shrimp & Oyster)			
Commercial Fisherman-Bait Seller	$ 5,130.00	$ 4,320.00	$ 4,500.00
Hoop Net	10,405.00	10,040.00	10,500.00
Fresh Water Seine	2,345.00	2,140.00	2,000.00
Fresh Water Trammel Net	8,045.00	6,295.00	6,500.00
Fresh Water Gill Net	23,325.00	21,830.00	22,000.00
Salt Water Fish & Shrimp Seine	770.00	1,190.00	1,200.00
Salt Water Trammel Net	2,235.00	1,775.00	2,000.00
Salt Water Menhaden Seine & Vessel	7,200.00	6,900.00	7,000.00
Oyster Vessel Tonnage	1,981.50	2,499.00	2,700.00
Oyster Dredging	12,400.00	15,400.00	16,000.00
Salt Water Fish Vessel	385.00	385.00	400.00
Salt Water Shrimp Trawl & Vessel	87,560.00	148,660.00	150,000.00
Salt Water Shrimp Freight	15.00	15.00	....
Oyster Bedding Ground	71,033.00	78,342.00	80,000.00
Oyster Shop & Resale	1,830.00	1,930.00	2,000.00
Wholesale Dealer	15,450.00	13,400.00	15,000.00
Wholesale Dealer's Agent	840.00	790.00	800.00
Retail Dealer	18,925.00	16,255.00	17,000.00
Non-Resident Minnow Dealer	....	400.00	400.00
Total Commercial Fishing & Dealers	$ 269,874.50	$ 332,566.00	$ 340,000.00
Severance Tax:			
Gravel	$	$ 2,149.85	$ 2,500.00
Sand & Fill Materials	14,329.63	75,739.87	80,000.00
Fur	22,654.71	12,468.19	13,000.00
Oyster	16,778.34	13,220.30	15,000.00
Shrimp	27,011.11	29,971.88	35,000.00
Total Severance Tax	$ 80,773.79	$ 133,550.09	$ 145,500.00
Miscellaneous Licenses & Receipts:			
Hunting Club	$ 1,095.00	$ 920.00	$ 1,000.00
Hunting Preserve	800.00	800.00	800.00
Game Breeder	1,300.00	1,460.00	1,500.00
Transfer of Oyster Lease	23.00	49.00	50.00
Resident Fur Buyer	3,050.00	3,350.00	3,400.00
Resident Fur Dealer	2,100.00	2,550.00	2,700.00
Non-Resident Fur Dealer	900.00	1,200.00	1,200.00
Trapper-New Orleans	402.00	426.00	450.00
Trapper-Other Parishes	5,083.82	6,093.56	6,400.00
Miscellaneous	322.70	1,115.02	1,000.00
Total Miscellaneous Licenses & Receipts	$ 15,076.52	$ 17,963.58	$ 18,500.00
Motorboat Registration	$ 58,848.75	$ 58,985.50	$ 210,000.00
Building Rental	$ 16,168.19	$ 105,803.10	$ 140,000.00
Royalities from Mineral Leases:			
Oil & Gas	$1,425,492.65	$ 1,866,043.09	$1,900,000.00
Sulphur	254,626.34	258,921.61	260,000.00
Total Royalties from Mineral Leases	$1,680,118.99	$ 2,124,964.70	$2,160,000.00
TOTAL CONSERVATION FUND RECEIPTS	$2,918,765.99	$ 3,647,272.58	$3,945,000.00

Exhibit 4 *(Continued next page)*

Exhibit 4 (Continued)

ALL RECEIPTS
CONSERVATION FUND, DEDICATED FUNDS AND FEDERAL FUNDS
ACTUAL RECEIPTS 1961-62 AND 1962-63
ESTIMATED RECEIPTS 1963-64

DEDICATED FUNDS	*Actual* *1961-62*	*Actual* *1962-63*	*Estimated* *1963-64*
Oyster Seed Ground:			
Shell Severance Tax	$ 407,597.38	$ 409,070.88	$ 410,000.00
Survey Fees	9,628.00	17,418.50	20,000.00
Rebedding Fees	6,125.60	3,481.60	5,000.00
Insurance Recovery	991.72	....	....
Total Oyster Seed Ground	$ 424,342.70	$ 429,970.98	$ 435,000.00
Commercial Seafood:			
Shell Severance Tax	$ 407,597.35	$ 409,070.90	$ 410,000.00
Sale of Equipment	1,001.50	....	....
Insurance Recovery	2,000.00	....	....
Total Commercial Seafood	$ 410,598.85	$ 409,070.90	$ 410,000.00
Rockefeller Refuge:[1]			
Royalties from Mineral Leases	$2,638,628.39[2]	$ 8,202,237.40[2]	$3,435,000.00
Fur Sales	359.86	466.64	500.00
Total Rockefeller Refuge	$2,638,988.25	$ 8,202,704.04	$3,435,500.00
Marsh Island Refuge:			
Royalties from Mineral Leases	$ 39,111.16[3]	$ 1,808,240.43[3]	$ 35,000.00
Pass-a-Loutre Hunting Permits	1,630.00	1,665.00	2,000.00
Pasturage	1,224.00	225.00	250.00
Fur Sales	18.20	132.00	200.00
Sale of Equipment	696.78	....	....
Insurance Recovery	....	2,326.00	....
Total Marsh Island Refuge	$ 42,680.14	$ 1,812,588.43	$ 37,450.00
TOTAL DEDICATED FUNDS RECEIPTS	$3,516,609.94	$10,854,334.35	$4,317,950.00
FEDERAL FUNDS[4]			
Pittman-Robertson	$ 257,879.47	$ 249,109.13	$ 270,000.00
Dingell-Johnson	45,254.19	27,550.55	30,000.00
Hyacinth Control	110,048.40	118,022.02	60,000.00
Water Pollution Control	70,318.00	74,512.62	50,000.00
TOTAL FEDERAL FUNDS RECEIPTS	$ 483,500.06	$ 469,194.32	$ 410,000.00
GRAND TOTAL ALL RECEIPTS	$6,918,875.99	$14,970,801.25	$8,672,950.00

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[1] Receipts derived from Rockefeller Refuge are to be used for improving and maintaining the refuge and surplus may be used for public education or for public health according to the act of dedication. Appropriations from this fund for public education and public health during the periods of this report have been as follows:

a) State Public School Fund:		
1962-63 Appropriation	$5,000,000.00	
1963-64 Appropriation	3,800,000.00	$ 8,800,000.00
b) State Board of Health Fund:		
1962-63 Appropriation	$2,500,000.00	
1963-64 Appropriation	4,011,909.00	6,511,909.00
Total Education and Health Appropriations		$15,311,909.00

[2] Includes $4,767,410.16 new lease Rockefeller Refuge.

[3] Includes $1,777,880.00 new Lease Marsh Island Refuge.

[4] "Federal Funds" implies that these receipts are gifts from the Federal Government. Actually this is our own money taken away from the state through Federal taxes and handed back to us; minus a commission charged by the Federal Government for handling.

Exhibit 5

EXPENDITURES
FUNDS, DIVISIONS AND MAJOR EXPENSE CLASSIFICATION
1961-62

	Personal Services	*Con-tractual Services*	*Travel*	*Material & Supplies*	*Retire-ment Ins. & Hosp.*	*Equip-ment*	*Major Repairs*	*Construc-tion*	*Credits*	*Total*	*%*
Administrative	$ 282,434.67	$125,215.02	$ 19,311.10	$ 49,795.30	$150,217.44	$ 3,382.32	$	$	$288,214.24	$ 342,141.61	6.3
Education & Publicity	104,099.87	148,727.32	9,164.21	30,390.41		15,597.64				307,979.45	5.7
Water Pollution Control	94,295.38	9,297.01	7,470.81	20,114.71		16,956.25				148,134.16	2.7
Enforcement	891,261.33	64,027.32	174,623.11	124,158.87		23,712.15	1,065.90			1,278,848.68	23.4
Fish and Game	310,581.07	48,063.14	39,625.65	101,209.01		37,594.24		4,997.60		542,070.71	9.9
Fur	22,207.50	1,698.58	1,302.71	2,481.65						27,690.44	.5
Pittman-Robertson	217,473.87	46,611.72	9,969.56	41,191.39	16,200.23	12,392.52				343,839.29	6.3
Dingell-Johnson	40,476.50	3,873.90	2,214.76	5,015.53	2,817.17	8,986.51				63,384.37	1.0
Rockefeller Refuge	143,664.46	73,312.67	3,346.27	115,080.83	10,756.45	112,507.26		475,597.06		934,265.00	17.1
Oyster Seed Grounds	177,240.04	143,268.61	11,899.90	101,077.72	11,203.41	16,718.48	4,190.00	12,000.00		477,598.16	8.7
Commercial Seafood	124,198.18	58,184.55	21,613.65	29,716.76	8,060.43	43,812.38		126,035.37		411,621.32	7.5
Hyacinth Control	211,915.46	22,941.12	10,897.31	58,728.13	14,609.56	22,309.80				341,401.38	6.3
Marsh Island	62,106.49	37,254.38	808.37	42,116.01	4,797.95	1,678.93		404.87		149,167.00	2.7
Building	60,735.40	25,765.77		13,248.89	2,545.32	400.24				102,695.62	1.9
TOTAL	$2,742,690.22	$808,241.11	$312,247.41	$734,325.21	$221,207.96	$316,048.72	$ 5,255.90	$619,034.90	$288,214.24	$5,470,837.19	100.%
Percentages	50.1	14.8	5.7	13.4	4.1	5.8	.1	11.3	5.3		100.%

Exhibit 6

EXPENDITURES
FUNDS, DIVISIONS, AND MAJOR EXPENSE CLASSIFICATION
1962-63

	Personal Services	*Con-tractual Services*	*Travel*	*Material & Supplies*	*Retire-ment Ins. & Hosp.*	*Equip-ment*	*Major Repairs*	*Construc-tion*	*Credits* *Total*		*%*
Administrative	$ 285,537.52	$113,212.42	$ 8,702.83	$ 48,050.77	$121,236.04	$ 3,604.79	$	$	$225,800.00	$ 354,544.37	7.7
Education & Publicity	44,270.85	69,815.37	1,193.02	6,996.91		2,595.43				124,871.58	2.7
Water Pollution Control	89,771.77	7,155.26	7,357.39	15,430.02		7,847.70				127,562.14	2.8
Enforcement	920,755.69	64,291.12	173,738.24	98,647.83		114,951.23				1,372,384.11	29.8
Fish and Game	342,576.08	46,442.82	34,098.19	77,367.16		3,225.43		100,000.00		603,709.68	13.1
Fur	22,925.00	1,784.68	1,275.04	2,416.42		2,683.43				31,084.57	.7
Pittman-Robertson	181,402.50	46,617.79	6,473.57	61,130.77	13,333.57	23,187.31				332,145.51	7.2
Dingell-Johnson	23,427.25	2,989.41	1,315.05	7,009.39	1,708.28	1,732.24				38,181.62	.8
Rockefeller Refuge	180,937.99	77,453.96	5,579.89	166,738.48	12,993.04	21,703.74	4,913.78			470,320.88	10.2
Oyster Seed Grounds	150,433.15	47,499.69	10,165.51	84,183.25	10,181.52	11,759.86	5,882.17			320,105.15	7.0
Commercial Seafood	122,026.66	50,403.82	17,795.10	38,573.63	8,217.12	15,501.31	5,882.18			258,399.82	5.6
Hyacinth Control	207,321.56	23,797.38	6,665.74	82,835.77	15,577.31	10,872.60				347,070.36	7.5
Marsh Island	64,100.39	20,829.43	1,123.41	30,613.14	4,972.71	28.60				121,667.68	2.7
Building	58,783.70	23,570.98		10,613.47	2,884.07	1,500.00	3,740.78			101,093.00	2.2
TOTAL	$2,694,270.11	$595,864.13	$275,482.98	$730,607.01	$191,103.66	$221,193.67	$ 20,418.91	$100,000.00	$225,800.00	$4,603,140.47	100.%
Percentages	58.5	13.0	6.0	15.9	4.1	4.8	.4	2.2	4.9		100.%

Exhibit 7

BUDGET

FUNDS, DIVISIONS AND MAJOR EXPENSE CLASSIFICATION
1963-1964

	Personal Services	*Con-tractual Services*	*Travel*	*Material & Supplies*	*Retire-ment Ins. & Hosp.*	*Equip-ment*	*Major Repairs*	*Construc-tion*	*Credits*	*Total*	*%*
Administrative	$ 292,931.00	$113,715.00	$ 13,462.00	$ 64,696.00	$ 22,320.00	$ 8,307.00	$.........	$.........	$225,800.00	$ 289,631.00	5.0
Education & Publicity	52,273.00	106,763.00	3,989.00	12,398.00	4,788.00	2,503.00	....	....	....	182,714.00	3.1
Water Pollution Control	100,377.00	11,798.00	9,971.00	24,471.00	8,347.00	2,642.00	....	....	....	157,606.00	2.7
Enforcement	952,836.00	110,237.00	173,508.00	151,915.00	84,634.00	57,155.00	14,134.00	....	....	1,544,419.00	26.6
Fish & Game	586,931.00	79,395.00	52,102.00	152,526.00	52,281.00	124,956.00	13,334.00	58,722.00	....	1,120,247.00	19.3
Hyacinth Control	233,009.00	34,853.00	9,971.00	79,515.00	19,709.00	17,223.00	....	....	....	394,280.00	6.8
Fur	21,908.00	2,000.00	1,197.00	3,546.00	1,823.00	1,296.00	....	....	....	31,770.00	.6
Building	63,108.00	26,924.00	....	15,836.00	3,351.00	356.00	....	....	....	109,575.00	1.9
Rockefeller	203,230.00	111,500.00	4,500.00	74,500.00	17,573.00	163,473.00	179,946.00	247,278.00	....	1,002,000.00	17.2
Oyster Seed Grounds	155,455.00	59,290.00	9,000.00	72,822.00	13,266.00	22,694.00	10,181.00	7,292.00	....	350,000.00	5.9
Commercial Seafood	140,980.00	102,175.00	18,000.00	33,000.00	11,957.00	25,775.00	1,405.00	66,708.00	....	400,000.00	6.9
Marsh Island	67,090.00	23,550.00	1,800.00	44,750.00	5,941.00	13,000.00	39,500.00	35,000.00	....	230,631.00	4.0
TOTAL	$2,870,128.00	$782,200.00	$297,500.00	$729,975.00	$245,990.00	$439,380.00	$258,500.00	$415,000.00	$225,800.00	$5,812,873.00	100.%
Percentage	49.3	13.5	5.1	12.6	4.2	7.6	4.5	7.1	3.9		100.%

Exhibit 8

OTHER EXPENDITURES

SEISMIC FUND

	1961-1962		*1962-1963*	
Balance as of July 1	$444,981.84		$410,499.49	
RECEIPTS	396,195.09	$841,176.93	315,233.78	$725,733.27
EXPENDITURES				
Personal Services	276,957.47		218,083.36	
Contractual Services	30,742.58		31,210.63	
Travel	104,350.88		82,701.86	
Material & Supplies	4,318.37		....	
Ret., Hosp. & Ins.	14,308.14	430,677.44	12,884.98	344,880.83
Balance as of June 30		$410,499.49		$380,852.44

WARD McILHENNY FUND

Balance as of July 1			$ 424.34	
RECEIPTS	$ 25,000.00	$ 25,000.00	38,467.56	$ 38,891.90
EXPENDITURES				
Personal Services	$ 22,323.81		$ 34,381.30	
Contractual Services	710.63		462.77	
Travel	1,541.22	$ 24,575.66	186.28	$ 35,030.35
Balance as of June 30		$ 424.34		$ 3,861.55

BOARD OF LIQUIDATION - BOAT RAMPS

Balance as of July 1				
RECEIPTS	$.........		$.........	$ 40,000.00

BODCAU GAME MANAGEMENT AREA FUND

	1961-1962		*1962-1963*	
Balance as of July 1	$ 12,309.26		$ 2,817.08	
RECEIPTS	....	$ 12,309.26	....	$ 2,817.08
EXPENDITURES				
Personal Services	792.00		....	
Contractual Services	269.63		....	
Material & Supplies	8,430.55		2,488.64	
Equipment	....	9,492.18	328.44	2,817.08
Balance as of June 30		$ 2,817.08		$.........

BAYOU LAMOQUE FUND

Balance as of July 1	$.........		$.........	
RECEIPTS	....	$.........	34,093.20	$ 34,093.20
EXPENDITURES				
Major Repairs	$.........		$ 34,093.20	$ 34,093.20
Balance as of June 30		$.........		$.........

DUCKS UNLIMITED

Balance as of July 1				
RECEIPTS		$ 8,139.08		$107,371.75
Contractual Services		8,139.08		107,371.75

Exhibit 9

LOUISIANA SHRIMP PRODUCTION BY PARISH AND VALUE TO FISHERMEN

	1962		*1961*	
Parish	*Barrels (Headless)*	*Value to Fishermen*	*Barrels (Headless)*	*Value to Fishermen*
Orleans	557	$ 43,749	8	$ 511
Cameron ...	21,225	1,496,092	16,073	1,013,574
Jefferson ...	38,161	2,973,438	29,121	1,783,884
Lafourche ..	35,208	2,673,802	25,826	1,537,056
Plaquemines	24,071	1,585,754	9,347	559,527
St. Bernard	6,724	493,118	3,847	209,935
St. Mary ...	11,940	1,435,267	14,493	1,191,396
Terrebonne .	61,170	3,673,929	42,849	2,193,004
Vermilion ..	8,485	609,576	6,184	423,935
Mississippi .	1,379	99,564	675	40,716
Total	208,920	$15,084,289	148,423	$8,953,556

Indications are that the bumper 1963 commercial shrimp crop will nearly double the 1962 production figure. 1963 figures were not complete for this publication. It is not possible to obtain figures on shrimp taken by sportsmen.

Shrimp samples are taken from an experimental pond on Grand Terre Island at weekly intervals to determine the growth rate. The information secured is of great benefit to the shrimp industry.

Exhibit 11

SHRIMP PRODUCTION AND NUMBER OF TRAWLS AND/OR SEINES—1913-1962

Calendar Year	*Barrels Shrimp (210 lbs.)*	*No. of Seines*	*No. of Trawls*
1913	50,000	131	....
1914	52,381	131	....
1915	57,143	268	....
1916	85,714	...	....
1917	57,143	...	....
1918	71,429	300	17
1919	76,190	...	....
1920	152,381	97	499
1921	163,012	135	983
1922	109,050	111	699
1923	153,749	128	1,021
1924	150,624	143	905
1925	154,722	180	1,010
1926	123,967	143	692
1927	150,896	120	913
1928	195,303	261	1,454
1929	210,033	125	1,486
1930	197,550	172	1,176
1931	178,815	126	1,131
1932	152,373	66	699
1933	166,058	67	1,045
1934	226,576	107	1,441
1935	252,981	125	1,433
1936	286,749	30	1,920
1937	362,942	35	2,313
1938	363,656	13	1,662
1939	395,050	26	1,621
1940	397,189	5	3,016
1941	554,354	5	3,028
1942	489,173	4	2,380
1943	441,445	4	2,101
1944	544,378	4	1,866
1945	495,994	4	2,373
1946	464,981	4	3,030
1947	365,617	4	3,408
1948	376,605	4	3,200
1949	376,040	4	3,310
1950	361,365	3	2,819
1951	396,980	0	2,248
1952	398,952	0	2,277
1953	437,340	10	3,543
1954	451,647	4	3,442
1955	365,542	5	3,276
1956	318,130	7	3,072
1957	181,061	9	2,419
1958	208,586	9	4,400
1959	254,438	8	4,154
1960	306,774	7	4,896
1961	148,423	8	4,577
1962	208,920	...	5,453

Exhibit 10

LOUISIANA SHRIMP PRODUCTION BY SIZE

	1962			*1961*		
Size (Per lb. Heads on)	*Barrels (Headless)*	*% of Total*	*Value to Fishermen*	*Barrels (Headless)*	*% of Total*	*Value to Fishermen*
Under 15	997	0.5	$ 128,303	1,987	1.3	$ 178,102
15-20	13,297	6.4	1,716,905	10,598	7.1	968,429
21-25	10,253	4.9	1,328,253	14,282	9.7	1,271,134
26-30	9,053	4.4	1,082,626	11,204	7.5	934.200
31-40	20,281	9.7	2,025,737	26,720	18.1	1,869,400
41-50	18,392	8.8	1,469,040	12,311	8.3	746,367
51-67	36,900	17.6	2,455,118	18,584	12.5	966,410
68 and over ..	86,184	41.2	4,500,957	41,029	27.6	1,659,468
Sea Bobs	13,563	6.5	377,350	11,708	7.9	360,046
Total	208,920	100.0	$15,084,289	148,423	100.0	$8,953,556

Exhibit 12

COMPARATIVE STATEMENT OF FRESH AND SALT WATER COMMERCIAL FISH PRODUCED BY LOUISIANA FISHERMEN

	1962		*1961*	
FRESH WATER FISHERIES	*Pounds*	*Value to Fishermen*	*Pounds*	*Value to Fishermen*
Bowfin	23,416	$ 1,107	33,500	$ 1,602
Buffalofish	3,546,260	419,511	2,872,500	384,397
Carp	290,557	10,933	276,900	13,845
Catfish & Bullhead	8,826,265	1,800,536	9,025,300	1,819,208
Garfish	1,170,854	60,424	942,300	48,584
Paddlefish (Spoonbill)	140,699	7,296	46,200	2,670
Sheepshead (Gaspergou)	1,259,880	121,049	1,266,000	134,462
Crawfish	3,097,119	408,180	2,186,900	288,323
Baby Green Turtles	14,779	75,000	27,700	207,750
Fresh Water Turtles	186,446	22,814	241,900	28,867
Frogs	70,120	24,285	93,200	32,495
Total Fresh Water Fisheries	18,626,395	$ 2,951,135	17,012,400	$ 2,962,203
SALT WATER FISHERIES				
Cobia	2,200	$ 115	3,800	$ 189
Croaker	6,497	350	17,900	885
Drum:				
Black	308,865	19,009	387,600	20,112
Red (Red Fish)	567,172	88,405	666,000	97,508
Flounder	216,080	32,556	221,000	29,844
Grouper	52,651	5,729	15,800	1,764
Jewfish	4,100	344	....	....
King Whiting (Black Mullet)	460,281	23,251	531,200	26,641
Menhaden	689,157,400	7,994,226	581,682,400	6,747,527
Mullet (Popeye)	8,269	388	11,900	464
Pompano	2,151	1,105	800	279
Sawfish	5,196	226	5,900	295
Sea Catfish	108,094	5,410	84,700	3,973
Sea Trout or Weakfish:				
Spotted	308,743	72,690	537,100	122,943
White	115,159	5,931	81,700	4,535
Shark	1,900	97	3,600	105
Sheepshead	151,476	11,951	144,600	9,523
Snapper, Red	693,893	156,405	677,200	149,612
Spanish Mackerel	470	40	1,700	163
Spot	1,500	75	2,900	145
Tripletail	3,100	155	900	42
Warsaw	....	....	9,500	877
Miscellaneous	2,200,000	27,500	582,000	7,275
Crabs:				
Hard	9,522,905	462,454	11,909,900	514,188
Soft & Peeler	343,881	171,900	620,300	310,200
Shrimp, Salt Water	43,583,686	14,984,954	31,027,000	8,912,840
Sea Turtles	3,300	199	6,300	813
Total Salt Water Fisheries	747,828,969	$24,065,465	629,233,700	$16,962,742
GRAND TOTAL	766,455,364	$27,016,600	646,246,100	$19,924,945

Fish production figures presented in Exhibit 12 were obtained in cooperation with U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries.

Exhibit 13

1962
COMMERCIAL FISHING AND DEALERS LICENSES SOLD BY PARISH, STATE AND CLASS

Parish	*S. W. Shrimp Trawl & Vessel*	*S. W. Fish Vessel*	*Menhaden Seine & Vessel*	*Oyster Tonnage*	*Oyster Dredging*	*Oyster Shop-Resale*	*Commercial Fisherman & Bait*	*Hoop Net*	*F. W. Seine*	*F. W. Trammel Net*	*F. W. Gill Net*	*S. W. Seine*	*S. W. Trammel Net*	*Retail Dealer*	*Wholesale Dealer*	*Wholesale Dealer Agent*	*Total Licenses Sold*	*Total Revenue*
Acadia	57	..	..	4	...	...	11	16	36	3	76	1	2	33	3	2	244	$ 2,159
Allen	9	..	..	...	...	...	2	27	...	6	11	..	...	27	...	..	82	635
Ascension	5	..	..	...	...	1	9	10	3	...	5	..	...	27	5	..	65	635
Assumption	9	..	..	...	...	...	1	43	1	1	....	..	...	20	7	8	90	1,170
Avoyelles	....	..	..	...	...	...	18	46	3	19	91	..	...	60	5	..	242	2,285
Beauregard	1	..	..	...	...	...	10	44	...	2	26	1	...	16	1	..	101	655
Bienville	....	..	..	...	...	...	24	8	...	4	16	..	...	26	1	..	79	720
Bossier	....	..	..	...	...	...	12	5	1	8	34	..	...	44	1	..	105	1,060
Caddo	1	..	..	...	...	...	44	32	7	20	90	..	1	173	10	..	378	3,690
Calcasieu	465	2	9	26	...	2	49	109	50	16	153	13	14	87	3	..	998	12,461
Caldwell	..	..	..	...	...	...	16	19	1	8	22	..	...	11	...	..	77	670
Cameron	193	1	9	91	...	4	16	2	1	1	11	10	6	5	4	..	354	5,481
Catahoula	....	..	..	...	...	...	14	29	3	32	70	..	...	13	9	4	174	2,065
Claiborne	....	..	..	...	...	...	1	1	...	...	3	..	...	9	...	..	14	85
Concordia	....	..	..	...	...	...	17	30	...	10	30	..	...	27	2	..	116	1,020
DeSoto	..	..	..	...	...	...	6	20	...	2	21	..	...	20	...	..	69	505
E. Baton Rouge	8	..	..	1	1	3	20	47	4	12	47	2	...	196	6	..	347	2,406
E. Carroll	....	..	..	...	...	...	9	13	6	16	44	..	...	25	3	..	116	1,505
E. Feliciana	....	..	..	...	...	...	...	5	...	3	5	..	...	11	...	..	24	165
Evangeline	7	..	..	...	...	...	9	45	16	20	41	..	...	83	...	..	221	1,275
Franklin	....	..	..	...	...	...	8	39	6	58	61	..	...	22	3	..	197	2,150
Grant	....	..	..	...	...	...	19	12	1	7	26	..	...	15	...	..	80	705
Iberia	91	..	..	2	...	1	7	18	...	1	5	10	3	64	7	1	210	2,952
Iberville	..	..	..	...	...	...	18	153	1	3	14	..	...	47	8	7	251	2,325
Jackson	....	..	..	...	...	...	5	3	...	4	8	..	3	31	...	..	54	380
Jefferson	652	2	..	23	9	17	22	5	2	1	13	2	14	171	31	5	969	16,832
Jefferson Davis	68	..	..	4	...	...	14	35	31	8	40	1	...	37	1	..	239	2,319
Lafayette	75	..	..	...	...	1	8	9	14	9	15	1	1	106	5	1	245	2,415
Lafourche	558	..	..	75	51	10	6	6	1	1	3	1	1	61	21	9	804	16,820
LaSalle	..	..	..	...	...	...	10	23	2	29	31	..	...	24	2	2	123	1,135
Lincoln	..	..	..	...	...	...	5	5	...	2	10	..	...	35	...	..	57	335
Livingston	....	..	..	...	...	...	8	27	...	4	7	..	...	27	1	..	74	525
Madison	....	..	..	...	...	...	1	17	1	15	22	..	...	17	...	1	74	610
Morehouse	1	..	..	...	...	...	14	33	1	33	50	..	...	55	2	..	189	1,740
Natchitoches	....	..	..	...	...	...	23	26	1	18	73	..	...	33	...	..	174	2,360
Orleans	195	4	..	43	15	44	34	5	3	...	24	3	25	775	39	1	1,210	11,735
Ouachita	....	..	..	...	...	...	45	45	4	45	136	1	...	102	4	..	382	3,410
Plaquemines	332	1	20	85	36	16	10	20	...	2	8	..	30	33	6	4	603	12,198
Pointe Coupee	....	..	..	1	...	...	26	5	4	2	18	..	...	21	...	..	77	588
Rapides	2	..	..	...	...	...	36	46	11	44	120	..	...	119	4	1	383	3,185
Red River	....	..	..	...	...	...	3	8	...	3	10	..	...	15	...	..	39	395

Exhibit 13 *(Continued next page)*

Exhibit 13 (Continued)

1962

COMMERCIAL FISHING AND DEALERS LICENSES SOLD BY PARISH, STATE AND CLASS

Parish	*S. W. Shrimp Trawl & Vessel*	*S. W. Fish Vessel*	*Menhaden Seine & Vessel*	*Oyster Tonnage*	*Oyster Dredging*	*Oyster Shop-Resale*	*Commercial Fisherman & Bait*	*Hoop Net*	*F. W. Seine*	*F. W. Trammel Net*	*F. W. Gill Net*	*S. W. Seine*	*S. W. Trammel Net*	*Retail Dealer*	*Wholesale Dealer*	*Wholesale Dealer Agent*	*Total Licenses Sold*	*Total Revenue*
Richland	....	..	..	...	...	...	9	22	4	27	59	..	...	32	3	..	156	$ 1,305
Sabine	....	..	..	...	...	...	14	22	...	2	17	..	...	14	...	..	69	450
St. Bernard	194	1	..	24	17	9	7	1	...	2	2	1	4	26	7	3	298	5,594
St. Charles	51	..	..	...	...	2	7	2	...	...	2	..	...	43	6	6	119	1,645
St. Helena	....	..	..	...	...	...	...	6	...	...	....	..	...	3	...	..	9	45
St. James	8	..	..	...	...	...	...	2	...	...	4	..	...	14	2	1	31	385
St. John	8	..	..	...	...	...	...	2	...	...	2	..	...	24	...	..	36	390
St. Landry	19	..	..	...	...	...	60	66	39	28	100	1	1	112	8	1	435	3,535
St. Martin	2	..	..	1	...	...	4	67	...	4	8	..	1	46	4	6	143	1,206
St. Mary	304	3	6	5	1	5	25	124	16	16	24	10	...	90	18	13	660	10,906
St. Tammany	21	1	..	1	1	1	99	20	...	1	7	1	3	68	1	..	225	1,635
Tangipahoa	4	..	..	4	4	4	7	13	...	9	8	..	...	93	4	..	150	1,355
Tensas	....	..	..	...	...	...	8	6	...	4	19	..	...	13	1	..	51	665
Terrebonne	1,178	13	..	103	24	21	16	5	1	...	4	2	24	59	50	7	1,507	29,333
Union	....	..	..	...	...	...	12	45	..	22	50	..	...	18	1	..	148	1,400
Vermilion	288	2	..	4	...	...	22	5	10	1	29	17	...	64	...	..	442	5,969
Vernon	....	..	..	...	...	...	10	13	1	1	15	..	...	18	1	..	59	400
Washington	....	..	..	...	...	...	27	20	...	3	3	..	...	60	3	..	116	730
Webster	....	..	..	...	...	...	17	34	...	13	48	..	...	54	...	..	166	1,420
W. Baton Rouge	....	..	..	...	...	...	6	8	2	3	13	..	...	12	...	..	44	355
W. Carroll	....	..	..	...	...	...	6	21	...	11	41	..	...	18	2	..	99	1,150
W. Feliciana	....	..	..	...	...	...	...	2	...	4	3	..	...	9	...	..	18	120
Winn	....	..	..	...	...	...	11	19	1	3	13	..	...	15	...	..	62	430
TOTAL	4,806	30	44	497	159	141	977	1,616	289	626	1,961	78	133	3,628	305	83	15,373	$196,184
Alabama	100	7	..	...	...	...	...	....	...	...	1	..	2	....	...	..	110	3,735
Florida	5	11	1	...	...	...	...	....	...	...	....	..	...	....	...	..	17	370
Mississippi	310	13	17	100	85	...	2	1	...	...	....	..	23	....	...	..	551	15,607
Texas	232	2	10	2	...	...	6	....	...	...	5	2	...	....	*1	..	260	5,962
TOTAL NON-RES.	647	33	28	102	85	...	8	1	...	...	6	2	25	....	1	..	938	$ 25,674
GRAND TOTAL	5,453	63	72	599	244	141	985	1,617	289	626	1,967	80	158	3,628	306	83	16,311	$221,858

*Non-Resident Wholesale Minnow Dealer

Exhibit 14

1963
COMMERCIAL FISHING AND DEALERS LICENSES SOLD BY PARISH, STATE AND CLASS

Parish	*S. W. Shrimp Trawl & Vessel*	*S. W. Fish Vessel*	*Menhaden Seine & Vessel*	*Oyster Tonnage*	*Oyster Dredging*	*Oyster Shop-Resale*	*Commercial Fisherman & Bait*	*Hoop Net*	*F. W. Seine*	*F. W. Trammel Net*	*F. W. Gill*	*S. W. Seine*	*S. W. Trammel Net*	*Retail Dealer*	*Wholesale Dealer*	*Wholesale Dealer Agent*	*Total Licenses Sold*	*Total Revenue*
Acadia	96	..	..	18	...	...	9	14	44	8	78	4	2	49	2	3	327	$ 2,973
Allen	11	..	..	6	...	...	5	25	4	9	11	..	...	31	...	..	102	676
Ascension	6	..	..	...	...	...	13	10	1	1	10	..	...	26	5	..	72	675
Assumption	9	..	..	...	...	...	2	43	3	1	7	..	...	18	6	6	95	1,105
Avoyelles	1	..	..	...	...	...	13	38	5	22	75	..	...	54	3	..	211	1,910
Beauregard	3	..	..	...	...	...	10	33	...	...	28	..	...	21	1	..	96	630
Bienville	....	..	..	...	...	...	23	9	1	6	27	..	...	27	...	..	93	705
Bossier	2	..	..	...	...	...	14	5	1	7	47	..	...	44	1	..	121	1,050
Caddo	2	..	..	...	...	...	38	25	7	20	101	..	...	165	10	..	368	3,115
Calcasieu	675	4	10	72	...	1	42	81	53	17	240	14	9	104	4	..	1,326	16,903
Caldwell	1	..	..	...	...	...	5	19	2	10	25	..	...	12	...	..	74	520
Cameron	221	..	8	297	...	3	12	2	2	...	30	11	6	27	4	..	623	6,507
Catahoula	1	..	..	...	...	...	9	30	6	26	43	1	1	16	8	3	144	1,735
Claiborne	....	..	..	...	...	...	2	2	...	1	3	..	...	9	...	..	17	85
Concordia	....	..	..	...	...	...	12	18	4	19	40	..	...	19	2	..	114	1,100
DeSoto	1	..	..	...	...	...	6	18	...	2	16	..	...	25	...	..	68	445
E. Baton Rouge	15	1	..	1	...	4	12	48	6	21	39	2	...	178	6	..	333	2,331
E. Carroll	....	..	..	...	...	...	5	10	6	15	46	..	...	21	1	..	104	980
E. Feliciana	....	1	..	...	...	...	1	4	...	3	3	..	...	8	...	..	20	115
Evangeline	9	1	..	...	...	...	12	54	13	20	51	..	1	50	...	..	211	1,195
Franklin	3	..	..	...	...	...	5	34	11	47	74	..	1	13	2	..	190	1,660
Grant	1	..	..	...	...	...	14	14	1	4	44	..	...	18	...	..	96	685
Iberia	164	1	..	2	...	...	7	13	2	1	10	12	4	64	4	1	285	4,059
Iberville	....	..	..	...	...	...	18	133	1	4	18	..	...	38	8	7	227	2,085
Jackson	....	..	..	...	...	...	4	3	...	3	13	..	...	31	...	..	54	305
Jefferson	810	2	..	26	10	26	20	7	...	3	8	2	16	164	30	3	1,127	20,363
Jefferson Davis	124	..	..	8	...	...	10	41	29	7	51	1	...	39	1	..	311	3,503
Lafayette	112	..	..	...	...	...	5	12	14	10	16	..	...	102	3	..	274	2,970
Lafourche	596	..	..	93	66	10	2	6	...	...	8	1	1	50	19	6	858	18,928
LaSalle	....	..	..	1	...	...	9	35	6	28	51	..	...	25	2	5	162	1,601
Lincoln	....	..	..	...	...	...	6	3	...	1	16	..	...	29	...	..	55	280
Livingston	1	..	..	...	...	...	8	24	...	7	11	..	...	17	2	..	70	520
Madison	....	..	..	...	...	...	3	10	...	20	25	..	...	16	...	..	74	515
Morehouse	1	..	..	...	...	...	11	38	1	37	49	..	1	52	1	..	191	1,285
Natchitoches	....	..	..	...	...	...	20	13	1	17	85	..	...	29	...	1	166	1,790
Orleans	286	2	..	43	19	47	35	7	4	5	17	5	25	711	30	1	1,237	12,927
Ouachita	....	..	..	...	...	...	32	47	9	56	174	1	...	93	5	1	418	2,920
Plaquemines	429	2	14	120	51	13	9	19	...	5	5	1	28	29	5	1	731	14,247
Pointe Coupee	....	..	..	...	...	...	18	7	4	6	21	..	...	14	...	..	70	530
Rapides	2	..	..	...	...	...	39	47	7	38	137	1	...	117	5	..	393	2,695
Red River	1	..	..	...	...	...	6	10	1	5	8	..	...	11	...	..	42	380
Richland	....	..	..	...	...	...	5	18	1	39	75	..	...	28	3	..	169	1,135

Exhibit 14 *(Continued next page)*

Exhibit 14 (Continued)

1963

COMMERCIAL FISHING AND DEALERS LICENSES SOLD BY PARISH, STATE AND CLASS

Parish	*S. W. Shrimp Trawl & Vessel*	*S. W. Fish Vessel*	*Menhaden Seine & Vessel*	*Oyster Tonnage*	*Oyster Dredging*	*Oyster Shop-Resale*	*Commercial Fisherman & Bait*	*Hoop Net*	*F. W. Seine*	*F. W. Trammel Net*	*F. W. Gill*	*S. W. Seine*	*S. W. Trammel Net*	*Retail Dealer*	*Wholesale Dealer*	*Wholesale Dealer Agent*	*Total Licenses Sold*	*Total Revenue*
Sabine	....	..	..	...	...	...	6	22	...	1	18	..	...	12	...	..	59	$ 300
St. Bernard	227	1	..	40	29	9	3	2	...	2	6	..	4	29	6	1	359	6,897
St. Charles	77	..	..	...	...	1	7	2	...	...	12	..	...	36	4	10	149	2,185
St. Helena	....	..	..	...	...	...	1	4	...	...	....	..	...	6	...	..	11	55
St. James	8	..	..	...	...	...	...	....	...	...	....	..	...	13	2	1	24	305
St. John	18	..	..	...	...	...	...	2	...	...	4	..	...	25	...	..	49	525
St. Landry	24	..	..	...	...	...	35	52	34	39	106	3	3	92	5	..	393	3,070
St. Martin	10	..	..	...	...	...	16	72	...	8	15	..	1	40	10	5	177	1,735
St. Mary	445	6	7	16	1	4	20	122	13	17	52	8	1	91	16	14	833	14,732
St. Tammany	23	..	..	1	1	...	115	24	1	2	6	1	3	66	1	..	244	1,719
Tangipahoa	7	..	..	5	6	8	13	13	...	7	11	..	...	87	3	..	160	1,506
Tensas	....	..	..	...	...	...	7	1	1	6	24	1	...	14	...	..	54	575
Terrebonne	1,263	2	5	91	44	15	10	4	...	...	4	5	29	64	47	13	1,596	32,629
Union	2	..	..	...	...	...	9	62	...	27	68	..	...	20	1	..	189	1,300
Vermilion	385	3	..	6	...	1	21	4	14	1	42	19	1	73	3	..	573	8,397
Vernon	1	..	..	...	...	...	17	17	...	1	12	..	...	17	...	..	65	345
Washington	....	..	..	...	...	...	22	30	...	...	9	..	...	61	3	..	125	765
Webster	2	..	..	...	...	...	10	33	1	19	82	..	...	54	...	1	202	1,490
W. Baton Rouge	2	..	..	...	...	...	3	9	1	2	9	1	...	10	...	..	37	225
W. Carroll	....	..	..	...	...	...	6	16	...	10	57	..	...	16	1	..	106	940
W. Feliciana	....	..	..	...	...	...	...	1	...	4	....	..	...	10	...	..	15	90
Winn	1	..	..	...	...	...	8	17	1	2	24	..	...	18	1	..	72	475
TOTAL LA.	6,078	26	44	846	227	142	860	1,538	316	699	2,397	94	137	3,448	276	83	17,211	$220,398
Alabama	151	3	..	1	...	...	...	....	...	1	....	..	1	....	...	..	157	$ 5,356
Florida	36	10	1	...	...	...	...	....	...	...	....	..	...	....	...	..	47	1,645
Mississippi	270	10	16	86	82	...	4	3	...	1	2	4	21	....	...	..	499	14,677
Texas	490	..	8	11	...	1	6	1	...	...	4	4	1	....	*1	..	527	13,721
TOTAL NON-RES.	947	23	25	98	82	1	10	4	...	2	6	8	23	....	1	..	1,230	$ 35,399
1963 TOTAL	7,025	49	69	944	309	143	870	1,542	316	701	2,403	102	160	3,448	277	83	18,441	$255,797
1962 TOTAL	5,453	63	72	599	244	141	985	1,617	289	626	1,967	80	158	3,628	306	83	16,311	221,858
Increase	1,572	..	..	345	65	2	...	....	27	75	436	22	2	....	...	..	2,130	$ 33,939
Decrease	....	14	3	...	...	...	115	75	...	...	....	..	...	180	29	..	.....	....
% Increase	28.8	..	..	57.6	26.6	1.4	...	....	9.3	12.0	22.2	27.5	1.3	....	...	..	13.1	15.3
% Decrease	....	22.2	4.2	...	...	...	11.7	4.6	...	...	....	..	...	5.0	9.5	..	.....	....

*Non-Resident Wholesale Minnow Dealer

Exhibit 15

1962

MISCELLANEOUS LICENSES SOLD BY PARISH, STATE AND CLASS

Parish	*Hunting Club*	*Hunting Preserve*	*Game Breeder*	*Fur Buyer*	*Fur Dealer*	*Total Licenses*	*Total Revenue*
Acadia	...	..	6	2	..	8	$ 110
Allen	...	..	3	1	..	4	55
Ascension	...	..	1	1	..	2	35
Assumption	2	..	...	4	..	6	110
Avoyelles	...	..	2	3	..	5	95
Beauregard	1	1	2	...	..	4	225
Bienville	1	..	1	...	..	2	15
Bossier	...	..	1	2	..	3	60
Caddo	1	1	14	3	1	20	570
Calcasieu	6	1	11	2	..	20	390
Cameron	3	..	...	5	..	8	140
Claiborne	...	..	2	...	..	2	20
DeSoto	...	..	2	...	..	2	20
E. Baton Rouge	4	..	6	1	..	11	105
E. Carroll	21	..	...	...	..	21	105
E. Feliciana	1	..	...	...	..	1	5
Franklin	4	..	...	...	..	4	20
Grant	...	..	1	...	..	1	10
Iberia	...	..	2	4	..	6	120
Iberville	...	..	1	...	..	1	10
Jefferson	...	..	5	6	1	12	350
Jefferson Davis	...	..	2	1	..	3	45
Lafayette	1	..	7	2	..	10	125
Lafourche	...	..	2	8	..	10	220
LaSalle	...	..	1	...	..	1	10
Lincoln	1	..	1	...	..	2	15
Livingston	...	..	2	2	..	4	70
Madison	64	..	...	...	..	64	320
Morehouse	38	..	1	1	..	40	225
Natchitoches	...	1	1	...	..	2	210
Orleans	5	..	6	7	6	24	1,160
Ouachita	9	..	1	...	1	11	205
Plaquemines	1	..	2	7	..	10	200
Rapides	2	..	4	2	..	8	100
Red River	...	..	1	1	..	2	35
Richland	3	..	1	1	..	5	50
Sabine	...	..	1	...	..	1	10
St. Bernard	...	..	1	11	..	12	285
St. Charles	2	..	...	4	..	6	110
St. John	...	..	1	...	..	1	10
St. Landry	...	..	5	1	..	6	75
St. Martin	...	..	2	1	..	3	45
St. Mary	1	..	1	7	..	9	190
St. Tammany	...	..	3	1	1	5	205
Tangipahoa	...	..	6	4	..	10	160
Tensas	5	..	1	1	..	7	60
Terrebonne	...	..	1	15	1	17	535
Union	2	..	3	2	..	7	90
Vermilion	7	..	1	6	2	16	495
Washington	1	..	...	1	..	2	30
Webster	...	..	3	1	..	4	55
W. Baton Rouge	1	..	1	...	..	2	15
W. Carroll	1	..	...	...	1	2	155
Winn	29	..	...	1	..	30	170
TOTAL LA.	217	4	122	122	14	479	$ 8,255
Arkansas	1	..	...	...	1	2	305
Mississippi	1	..	...	...	..	1	5
New York	...	..	...	...	2	2	600
Texas	...	..	1	...	1	2	310
TOTAL	219	4	123	122	18	486	$ 9,475

Exhibit 16

1963

MISCELLANEOUS LICENSES SOLD BY PARISH, STATE AND CLASS

Parish	*Hunting Club*	*Hunting Preserve*	*Game Breeder*	*Fur Buyer*	*Fur Dealer*	*Total Licenses*	*Total Revenue*
Acadia	...	..	8	1	..	9	$ 105
Allen	...	..	7	2	..	9	120
Ascension	1	..	1	1	..	3	40
Assumption	2	..	...	5	..	7	135
Avoyelles	...	..	2	3	..	5	95
Beauregard	...	..	1	1	..	2	35
Bienville	1	..	1	...	..	2	15
Bossier	1	..	...	1	..	2	30
Caddo	4	1	14	5	..	24	485
Calcasieu	6	1	14	2	..	23	420
Caldwell	3	..	...	...	..	3	15
Cameron	3	..	1	4	..	8	125
Catahoula	1	..	...	...	..	1	5
Claiborne	...	..	2	...	..	2	20
Concordia	1	..	...	...	..	1	5
DeSoto	...	..	1	1	..	2	35
E. Baton Rouge	11	..	9	2	..	22	195
E. Carroll	18	..	...	...	..	18	90
E. Feliciana	...	1	...	...	..	1	200
Evangeline	...	..	...	1	..	1	25
Franklin	9	..	2	...	..	11	65
Grant	1	..	2	...	..	3	25
Iberia	...	..	3	3	..	6	105
Iberville	...	..	1	2	..	3	60
Jackson	...	..	1	...	..	1	10
Jefferson	1	..	5	12	2	20	655
Jefferson Davis	1	..	1	1	..	3	40
Lafayette	...	..	4	...	..	4	40
Lafourche	...	..	3	6	..	9	180
LaSalle	...	..	1	1	..	2	35
Lincoln	1	..	1	...	..	2	15
Livingston	2	..	3	3	..	8	115
Madison	71	..	...	...	..	71	355
Morehouse	36	..	...	1	..	37	205
Natchitoches	3	1	1	...	..	5	225
Orleans	3	..	2	5	8	18	1,360
Ouachita	14	..	3	1	1	19	275
Plaquemines	...	..	1	12	..	13	310
Pointe Coupee	1	..	...	1	..	2	30
Rapides	3	..	4	2	..	9	105
Red River	...	..	...	1	..	1	25
Richland	10	..	...	1	..	11	75
St. Bernard	...	..	3	7	..	10	205
St. Charles	2	..	...	2	1	5	210
St. Helena	...	..	1	...	..	1	10
St. James	1	..	...	1	..	2	30
St. John	...	..	2	...	..	2	20
St. Landry	2	..	7	1	1	11	255
St. Martin	...	..	...	1	..	1	25
St. Mary	2	..	1	14	1	18	520
St. Tammany	...	..	5	2	1	8	250
Tangipahoa	1	..	5	3	..	9	130
Tensas	5	..	2	1	..	8	70
Terrebonne	...	..	3	14	1	18	530
Union	2	..	3	1	..	6	65
Vermilion	7	..	2	8	1	18	405
Vernon	1	..	...	...	..	1	5
Washington	...	..	1	1	..	2	35
Webster	...	..	3	2	..	5	80
W. Baton Rouge	...	..	2	...	..	2	20
W. Carroll	8	..	...	...	..	8	40
W. Feliciana	9	..	...	...	1	10	195
Winn	1	..	...	...	..	1	5
TOTAL LA.	249	4	139	139	18	549	$ 9,610
Arkansas	1	..	...	...	1	2	305
Mississippi	2	..	...	...	..	2	10
New York	...	..	...	...	2	2	600
Texas	...	..	1	...	1	2	310
TOTAL	252	4	140	139	22	557	$10,835

Exhibit 17

NUMBER OF HUNTING LICENSES SOLD SEASONS 1939-1940 THROUGH 1962-1963

Season	*Total Licenses*	*Hunting Resident Season*	*Hunting Non-Resident Season*	*Hunting Non-Resident*	*Hunting Big Game*
1939-40	98,167	93,587	1,335	3,245	.....
1940-41	116,653	115,336	166	1,151	.....
1941-42	146,648	144,349	495	1,804	.....
1942-43	119,543	118,300	163	1,080	.....
1943-44	94,609	93,334	181	1,094	.....
1944-45	124,485	121,767	407	2,311	.....
1945-56	162,872	160,795	409	1,681	.....
1946-47	170,396	169,652	744	*	.....
1947-48	176,715	175,482	1,233	*	.....
1948-49	222,201	221,702	499	*	.....
1949-50	235,447	234,964	483	1,140	.....
1950-51	235,472	234,195	137	1,140	.....
1951-52	235,855	234,177	192	1,486	.....
1952-53	209,665	207,428	169	2,068	.....
1953-54	251,488	248,496	**2,992	....	.....
1954-55	242,456	239,695	**2,761	....	.....
1955-56	246,731	243,756	**2,975	....	.....
1956-57	287,810	284,844	**2,966	....	.....
1957-58	284,279	281,708	**2,571	....	.....
1958-59	275,622	272,756	**2,866	....	.....
1959-60	280,672	278,288	**2,384	....	.....
1960-61	317,087	257,438	528	2,659	56,462
1961-62	309,367	247,227	381	1,748	60,011
1962-63	332,513	260,862	367	1,814	69,470

*No trip licenses issued during these years.

**Non-Resident sold on a reciprocal basis. These licenses include both season and trip.

1. All resident persons who have reached their sixtieth birthday and have actually resided within the state for two years prior to application, are issued free permanent permits.

2. All resident and non-resident persons under sixteen years of age are exempt.

Louisiana's $2.00 Basic Resident Hunting License is below the national average which is $3.22.

RESIDENT SMALL GAME LICENSE FEES IN THE U. S. - 1961

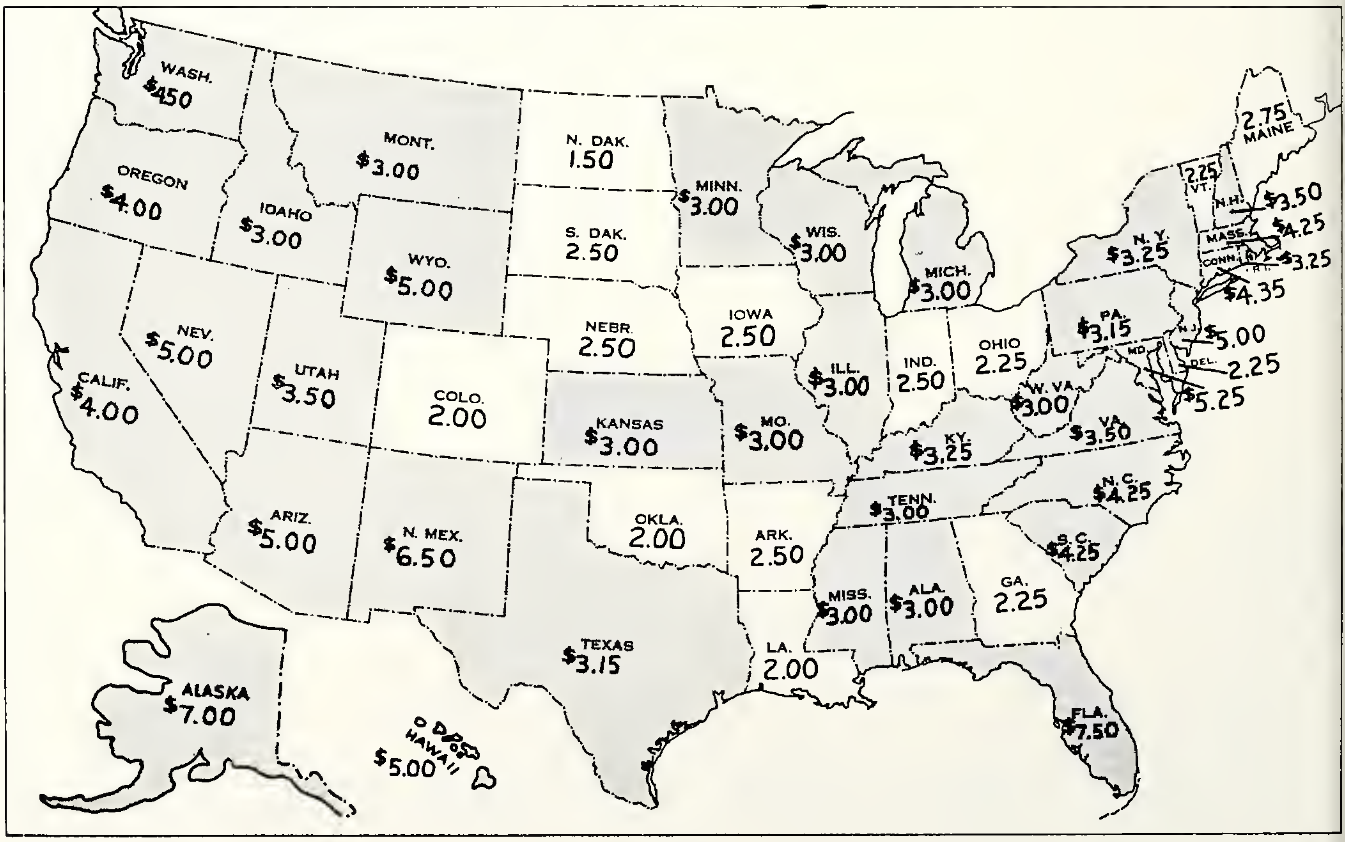


Exhibit 18

LICENSES SOLD BY PARISHES, 1961-62 SEASON HUNTING

Parish	*Basic Res. $2.00*	*N.R. Trip $5.00*	*N. R. Season $25.00*	*Big Game $2.00*
Acadia	4,076	15	0	175
Allen	3,560	77	6	1,596
Ascension	2,556	0	0	294
Assumption	1,167	0	0	143
Avoyelles	4,219	5	0	924
Beauregard	2,734	37	13	888
Bienville	1,886	3	0	495
Bossier	5,383	2	0	2,025
Caddo	13,987	40	5	4,259
Calcasieu	13,331	313	63	1,971
Caldwell	1,476	8	0	897
Cameron	1,073	220	26	42
Catahoula	1,796	13	3	1,052
Claiborne	1,523	15	7	668
Concordia	2,807	48	73	1,618
DeSoto	1,970	22	6	456
E. Baton Rouge	14,880	23	2	2,370
E. Carroll	1,481	37	7	871
E. Feliciana	1,290	2	0	197
Evangeline	3,752	1	0	830
Franklin	3,005	16	0	1,801
Grant	2,058	2	0	781
Iberia	4,269	15	0	296
Iberville	2,259	2	0	315
Jackson	2,123	3	0	1,138
Jefferson	10,127	0	0	572
Jefferson Davis	3,494	49	0	253
Lafayette	6,034	18	1	229
Lafourche	4,843	0	0	248
LaSalle	2,528	9	0	1,223
Lincoln	2,341	7	1	983
Livingston	3,754	2	0	876
Madison	1,693	103	22	1,160
Morehouse	4,323	35	11	2,205
Natchitoches	3,981	12	5	1,310
Orleans	11,341	90	36	737
Ouachita	11,728	45	6	4,773
Plaquemines	1,486	0	0	157
Pointe Coupee	1,806	1	0	385
Rapides	10,812	27	4	2,974
Red River	1,020	23	1	522
Richland	3,176	12	0	1,591
Sabine	2,590	13	4	1,152
St. Bernard	1,445	4	0	168
St. Charles	2,022	0	0	304
St. Helena	619	0	0	127
St. James	1,281	0	0	219
St. John	1,021	0	0	72
St. Landry	8,220	13	4	1,102
St. Martin	2,040	0	0	150
St. Mary	4,244	5	0	411
St. Tammany	4,666	24	28	508
Tangipahoa	5,644	1	2	579
Tensas	1,507	58	8	1,187
Terrebonne	4,631	2	0	231
Union	2,592	40	24	1,197
Vermilion	4,096	146	3	252
Vernon	3,239	24	4	1,392
Washington	2,992	8	1	696
Webster	3,978	10	0	1,022
W. Baton Rouge	1,532	4	0	255
W. Carroll	2,490	30	4	1,551
W. Feliciana	858	1	0	189
Winn	2,372	13	1	947
TOTAL 1961-62	247,227	1,748	381	60,011
TOTAL 1960-61	257,438	2,659	528	56,462
Increase	.....	....	...	3,549
	.....	....	...	6.3%
Decrease	10,211	911	147	.....
	4.0%	3.4%	27.8%	

Exhibit 19

LICENSES SOLD BY PARISHES, 1962-63 SEASON HUNTING

Parish	*Basic Res. $2.00*	*N. R. Trip $5.00*	*N. R. Season $25.00*	*Big Game $2.00*
Acadia	4,067	2	0	222
Allen	3,604	66	5	1,507
Ascension	2,699	0	0	350
Assumption	1,327	0	0	208
Avoyelles	4,320	0	0	937
Beauregard	2,833	41	6	941
Bienville	2,104	7	0	635
Bossier	5,152	0	1	1,803
Caddo	14,791	45	4	5,232
Calcasieu	13,381	305	54	2,117
Caldwell	1,678	8	0	996
Cameron	996	128	34	47
Catahoula	1,909	6	4	998
Claiborne	1,706	28	15	610
Concordia	3,181	68	63	1,937
DeSoto	2,160	35	6	584
E. Baton Rouge	15,390	14	1	3,321
E. Carroll	1,614	72	5	928
E. Feliciana	1,439	4	0	232
Evangeline	4,038	2	1	879
Franklin	3,415	17	0	2,254
Grant	2,091	9	0	1,040
Iberia	4,334	11	0	327
Iberville	2,288	0	0	429
Jackson	2,428	3	0	1,334
Jefferson	10,279	0	0	661
Jefferson Davis	3,435	41	1	248
Lafayette	6,164	13	0	428
Lafourche	5,596	0	0	302
LaSalle	2,684	10	0	1,383
Lincoln	2,493	9	2	1,105
Livingston	4,087	0	0	1,004
Madison	1,868	114	29	1,321
Morehouse	4,686	68	11	2,499
Natchitoches	4,062	17	0	1,438
Orleans	11,465	127	23	744
Ouachita	12,630	14	7	5,955
Plaquemines	1,522	0	0	180
Pointe Coupee	2,028	1	0	450
Rapides	11,325	53	3	3,456
Red River	1,098	23	0	510
Richland	3,531	14	1	1,884
Sabine	2,716	19	6	1,259
St. Bernard	1,437	1	0	185
St. Charles	1,964	3	0	311
St. Helena	726	1	0	173
St. James	1,419	0	0	249
St. John	973	0	0	98
St. Landry	8,478	7	1	1,289
St. Martin	2,091	1	0	143
St. Mary	4,241	11	0	510
St. Tammany	4,892	33	27	547
Tangipahoa	5,903	2	3	716
Tensas	1,658	88	8	1,430
Terrebonne	5,042	2	0	239
Union	2,491	38	21	1,420
Vermilion	3,980	121	2	246
Vernon	3,789	28	9	1,731
Washington	5,187	14	3	766
Webster	4,410	11	1	1,485
W. Baton Rouge	1,698	2	0	308
W. Carroll	2,558	41	7	1,678
W. Feliciana	882	1	0	215
Winn	2,429	15	3	1,036
TOTAL 1962-63	260,862	1,814	367	69,470
TOTAL 1961-62	247,227	1,748	381	60,011
Increase	13,635	66	...	9,459
	5.5%	3.8%	...	15.8%
Decrease	.....	....	14	.....
	.....	....	3.7%	.....

Exhibit 20

NUMBER OF FISHING LICENSES SOLD
SEASONS 1939 THROUGH 1962-1963

Season	*Total*	*Fishing Resident*	*Fishing Non-Resident*	*Fishing Non-Resident 7-Day Trip*
1939	27,096	12,649	14,447	** .....
1940	31,014	16,140	14,874	** .....
1941	52,695	38,080	*14,615	** .....
1942	41,661	30,608	*11,053	.....
1943	36,112	29,492	3,332	3,288
1944	33,239	25,755	3,743	3,741
1945	35,002	27,000	4,088	3,914
1946	52,909	42,621	5,808	4,480
1947	64,055	59,353	4,702	** .....
1948	66,797	63,657	3,140	** .....
1949	82,942	72,397	5,970	4,575
1950	83,068	72,044	5,872	5,152
1951	89,337	76,516	6,477	6,344
1952	102,715	89,159	6,207	7,349
1953	205,049	178,994	10,087	15,968
1954	217,282	187,832	12,048	17,402
1955	220,835	187,466	13,917	19,452
1956	218,757	186,106	14,817	17,834
1957	188,874	159,664	14,124	15,086
1958	192,290	165,566	13,364	13,360
1959	179,820	155,074	14,736	10,010
1960	153,848	134,231	10,519	9,098
1960-61***	139,899	127,198	4,913	7,788
1961-62	224,601	202,297	8,508	13,796
1962-63	220,335	196,419	9,064	14,852

*Includes both annual and 7-day trip.
**No 7-day trip licenses issued during these years.
***Licenses issued on fiscal year basis starting with 1960-61 season.

1. All resident persons who have reached their sixtieth birthday and have actually resided within the state for two years prior to application, are isued free permanent permits.
2. All resident and non-resident persons under sixteen years of age are exempt.
3. No resident is required to have a fishing license unless a reel or artificial bait is used.

Louisiana not only requires just a fraction of those who fish to be licensed, but we also stand alone with our $1.00 resident fishing license.

RESIDENT FISHING LICENSE FEES IN THE U.S. - 1961

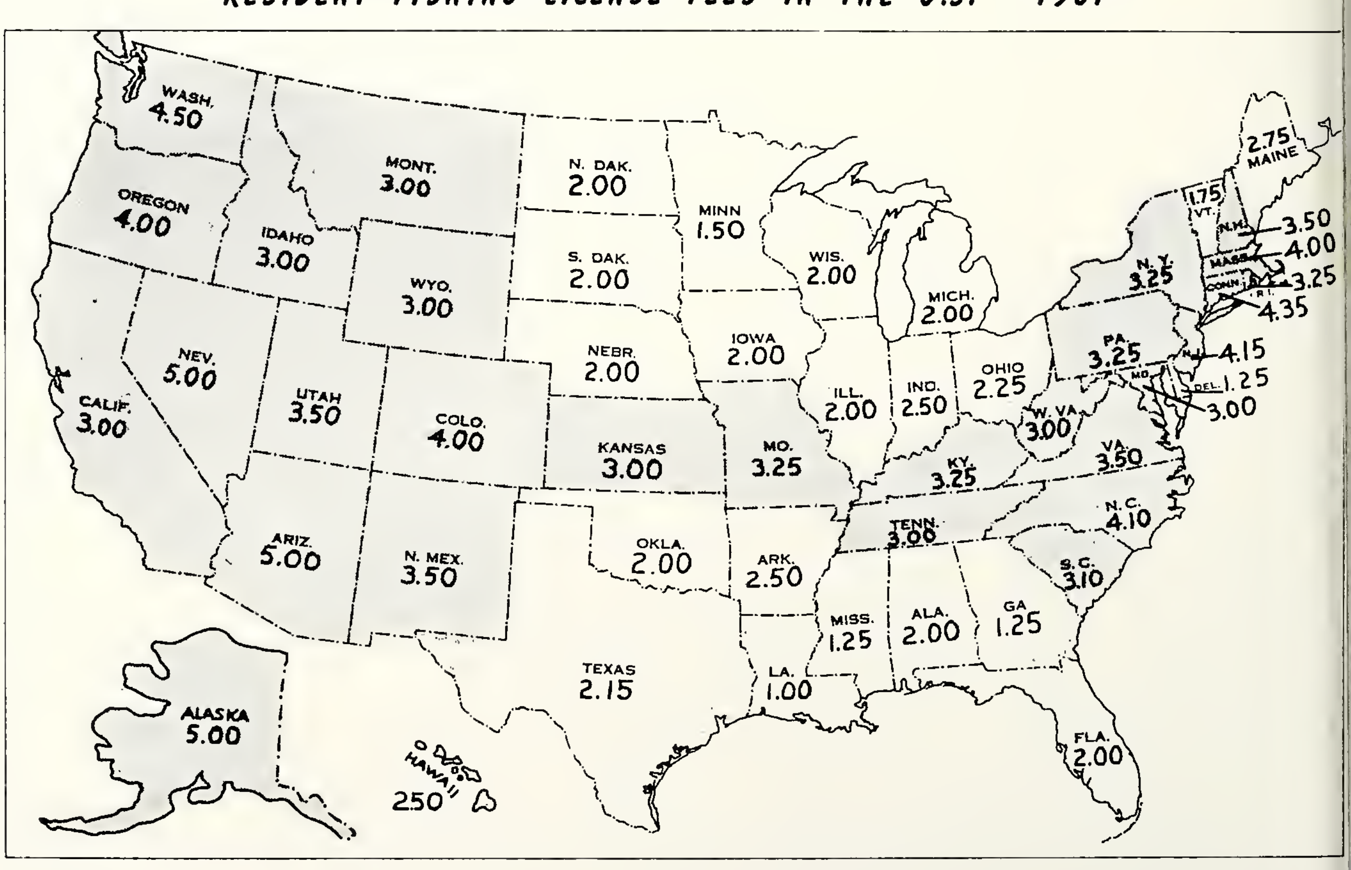


Exhibit 21

LICENSES SOLD BY PARISHES, 1961-62 SEASON

Parish	*Fishing*			*Trapping*
	Resident $1.00	*N. R. Trip $2.00*	*N. R. Annual $5.00*	*$2.00*
Acadia	1,561	8	1	20
Allen	1,681	34	11	62
Ascension	1,599	7	2	26
Assumption	364	7	0	45
Avoyelles	2,470	294	48	50
Beauregard	1,776	82	38	29
Bienville	1,261	177	10	7
Bossier	6,061	374	66	10
Caddo	13,786	1,700	562	57
Calcasieu	14,172	588	1,843	99
Caldwell	371	12	4	25
Cameron	947	239	681	128
Catahoula	850	413	87	10
Claiborne	613	8	5	10
Concordia	1,996	1,438	1,835	10
DeSoto	659	102	32	35
E. Baton Rouge	14,623	117	160	14
E. Carroll	535	137	47	36
E. Feliciana	295	5	3	4
Evangeline	1,726	9	3	37
Franklin	1,091	9	6	28
Grant	1,432	74	14	20
Iberia	4,096	40	7	11
Iberville	1,635	11	7	17
Jackson	1,084	56	19	34
Jefferson	13,001	11	7	44
Jefferson Davis	2,194	26	6	116
Lafayette	4,124	23	8	9
Lafourche	3,355	7	0	108
LaSalle	1,602	471	63	11
Lincoln	1,006	32	7	13
Livingston	2,103	68	40	44
Madison	628	104	137	56
Morehouse	2,502	164	213	60
Natchitoches	3,487	3,001	367	33
Orleans	25,362	453	705	201
Ouachita	6,844	320	23	62
Plaquemines	1,417	0	5	99
Pointe Coupee	1,336	68	13	10
Rapides	10,747	296	33	69
Red River	387	264	43	19
Richland	972	42	3	67
Sabine	676	13	8	13
St. Bernard	3,350	2	3	131
St. Charles	2,205	0	0	43
St. Helena	89	3	0	10
St. James	570	0	2	35
St. John	482	0	0	34
St. Landry	5,319	92	22	48
St. Martin	1,997	26	5	43
St. Mary	2,842	77	11	138
St. Tammany	3,865	360	425	66
Tangipahoa	2,390	68	45	67
Tensas	834	831	343	25
Terrebonne	5,199	30	4	202
Union	804	67	80	34
Vermilion	1,628	7	1	80
Vernon	3,550	210	117	26
Washington	1,794	24	159	46
Webster	2,544	249	51	42
W. Baton Rouge	2,629	30	1	10
W. Carroll	476	57	11	40
W. Feliciana	178	3	3	2
Winn	1,125	356	53	24
TOTAL 1961-62	202,297	13,796	8,508	3,004
TOTAL 1960-61	127,198	7,788	4,913	3,613
Increase	75,099	6,008	3,595	....
	59.0%	77.2%	73.2%	....
Decrease	......	.....	....	609
	......	.....	....	16.9%

Exhibit 22

LICENSES SOLD BY PARISHES, 1962-63 SEASON

Parish	*Fishing*			*Trapping*
	Resident $1.00	*N. R. Trip $2.00*	*N. R. Annual $5.00*	*$2.00*
Acadia	1,495	6	0	20
Allen	1,757	26	15	98
Ascension	1,886	8	5	24
Assumption	376	1	0	60
Avoyelles	2,647	391	50	114
Beauregard	2,060	108	45	49
Bienville	1,028	125	9	16
Bossier	5,933	340	41	14
Caddo	125,582	1,580	609	67
Calcasieu	13,278	446	1,334	122
Caldwell	415	26	11	42
Cameron	860	321	1,067	125
Catahoula	756	498	125	15
Claiborne	769	29	39	11
Concordia	1,960	1,487	1,873	14
DeSoto	619	103	42	36
E. Baton Rouge	14,126	226	154	14
E. Carroll	423	118	43	51
E. Feliciana	250	4	2	7
Evangeline	1,205	48	8	43
Franklin	924	30	4	43
Grant	1,502	113	20	29
Iberia	4,017	47	6	35
Iberville	1,780	14	1	21
Jackson	995	67	5	28
Jefferson	12,687	12	3	25
Jefferson Davis	1,981	19	6	149
Lafayette	4,271	59	4	6
Lafourche	3,163	0	3	122
LaSalle	1,602	497	125	17
Lincoln	914	29	5	14
Livingston	1,843	41	31	57
Madison	426	82	109	75
Morehouse	2,262	298	139	58
Natchitoches	2,902	3,032	386	34
Orleans	25,636	510	1,114	213
Ouachita	6,240	243	22	79
Plaquemines	1,438	0	0	99
Pointe Coupee	1,140	65	11	20
Rapides	9,972	414	33	81
Red River	359	254	43	24
Richland	935	31	8	86
Sabine	657	19	13	17
St. Bernard	3,573	5	4	46
St. Charles	2,020	8	1	45
St. Helena	106	1	2	7
St. James	613	0	0	25
St. John	460	0	0	15
St. Landry	6,090	80	17	56
St. Martin	1,800	20	8	40
St. Mary	2,882	71	17	343
St. Tammany	4,022	419	540	86
Tangipahoa	2,625	82	49	55
Tensas	771	1,051	326	27
Terrebonne	4,744	40	2	235
Union	544	62	44	30
Vermilion	1,465	7	5	125
Vernon	3,247	241	89	34
Washington	2,757	347	270	46
Webster	2,528	195	59	48
W. Baton Rouge	2,481	43	8	15
W. Carroll	384	37	12	77
W. Feliciana	157	1	0	2
Winn	1,079	375	48	35
TOTAL 1962-63	196,419	14,852	9,064	3,666
TOTAL 1961-62	202,297	13,796	8,508	3,004
Increase	......	1,056	556	662
	......	7.7%	6.5%	22.0%
Decrease	5,878	.....	....	....
	2.9%	.....	....	....

Exhibit 23

REPORT OF CERTIFICATES OF NUMBER ISSUED TO MOTORBOATS

Certificates Issued During Period—January 1, 1963-June 30, 1963

Hull Material	*Under 16 ft.*		*16 to Less Than 26 ft.*		*26 to Less Than 40 ft.*		*40-65 ft.*		*Over 65 ft.*		*Total*	
	Inboard	*Outboard*	*Inboard*	*Outboard*	*Inboard*	*Outboard*	*Inboard*	*Outboard*	*Inboard*	*Outboard*	*Inboard*	*Outboard*
Wood	22	1,029	380	594	108	8	10	1	..	..	520	1,632
Steel	...	8	12	18	32	18	3	6	..	..	47	50
Aluminum	3	743	7	124	12	1	..	..	..	..	22	868
Plastic	5	617	32	356	3	1	..	..	..	..	40	974
Other	...	139	8	63	1	2	..	..	..	..	9	204
TOTAL	30	2,536	439	1,155	156	30	13	7	..	..	638	3,728
Certificates Cancelled and Withdrawn During Period												
Wood	2	64	11	45	9	..	4	..	..	..	26	109
Steel	..	1	1	..	6	..	2	1	..	..	9	2
Aluminum	..	13	..	9	..	..	..	..	..	..	..	22
Plastic	..	16	1	4	..	..	..	..	..	..	1	20
Other	..	3	..	..	..	..	..	..	..	..	..	3
TOTAL	2	97	13	58	15	..	6	1	..	..	36	156
Total Valid Certificates Outstanding To Date—July 1, 1960-June 30, 1963												
Wood	456	23,726	4,768	13,649	3,416	222	291	5	12	..	8,943	37,602
Steel	59	100	281	215	886	149	93	16	2	..	1,321	480
Aluminum	33	7,765	51	1,296	57	32	5	1	..	..	146	9,094
Plastic	28	5,714	149	3,362	15	27	1	1	..	..	193	9,104
Other	11	1,756	36	895	10	15	2	1	..	..	59	2,667
TOTAL	587	39,061	5,285	19,417	4,384	445	392	24	14	..	10,662	58,947

This statistical report is submitted to the United States Coast Guard Headquarters, Washington D.C. semi-annually. The upper portion shows registrations for the period reported and the lower portion shows cumulative registrations to date after cancellations have been deducted.

Nearly 70,000 motorboat certificates were issued between July 1, 1960 and June 30, 1963. This does not reflect the number of boats in use in Louisiana because registration is required for only those boats exceeding 10 H. P.

The water hyacinth control section of the Commission is constantly on the alert to rid the state's streams, such as the one above, from noxious weeds.

Information and Education Division

STEVE HARMON
Chief

PUBLIC RELATIONS in all big business has become recognized as one of the essential factors putting messages over to the people. In delivering its own message of conservation of wildlife resources the Louisiana Wild Life and Fisheries Commission operates in much the same manner as a large corporation.

Charged with these duties the Division of Education and Publicity has many functions. However, its primary obligation is the dissemination of education towards the furtherance of the conservation movement. To this end it is necessary that personnel of this division be thoroughly conversant with the functions and activities of all other divisions of the commission in order to keep the public informed. In this phase of operations all possible media such as the press, television, radio, sports publications, clubs and organizations, are used to the utmost.

Also trained members of the staff are always available to supply information sought by individuals, schools, civic organizations, bureaus and institutions of various kinds. Through these additional mediums it has been possible for us to reach more people and acquaint them with our activities and plans for the future welfare of our natural wildlife resources and in so doing members of our staff are virtually ambassadors of good will for the Commission.

Because of the fact that it has become more and more evident, in recent years, that, not only conservation agencies but also, the outdoor loving public must join in this nation-wide movement if we are to have space for recreational activities to meet the requirements of our explosive population; national publications and media of all kinds have joined in this endeavor. As a result this has placed increased duties on our staff since this division is looked upon as a primary source of information for Louisiana on such matters. In other words, we are required at all times to supply not only Louisianians with information but also to service the nation's wildlife media with material.

Within the confines of our own state, it is

J. E. MORGAN
Museum Curator

E. T. WALDO
Information Representative

McFADDEN DUFFY
Information Representative

the day to day responsibility of the division to originate all news releases which develop in the commission, all directives from the director and division heads, as well as special material required by outdoor writers, newspaper columnists, and contributors to national magazines which cover the fishing and hunting fields. Also to supply information on allied conservation matters such as water pollution, aquatic weed and water hyacinth control and other such operations pertaining to our fish and game.

Another prime effort in conservation is the publication of the LOUISIANA CONSERVATIONIST, a bi-monthly magazine, which has an ever-rising unsolicited circulation. The magazine, began publication in 1948 and has climbed in subscribers from an humble beginning to 85,000 per issue.

This magazine transmits messages of our biologists, game management experts, scientists and division executives to the public, advocating the need of conservation, the advantages of modern fish and game management and the warnings of the encroachment that endangers our wildlife resources. Also programs that must be devised and developed if our wildlife is to remain in the abundance necessary to continue our national heritage.

Since its inception the LOUISIANA CONSERVATIONIST has grown not only in circulation, but also in national prestige and ranks with the best of its kind in the nation.

Besides assembling and publishing the abov mentioned publication our division is charge with assembling this biennial report to the legislature. This report is not only for the information of the state legislators, but is so compile and arranged that it is used widely in all th state's schools and libraries as a source of factua data on wildlife and its management.

In addition to servicing publications, television and radio, this division does a great deal o groundwork among youth groups such as th Boy and Girl scouts, organizations and schoo classes throughout the state, lecturing and showing sound movies concerning conservation an wildlife resources. Members of the staff hav assisted in arranging displays at numerous fair and meetings and in organizing new clubs an providing them with materials to carry on their work.

In reference to the latter, the museum section contructs and maintains these exhibits and they are widely in demand and serve to convey the message of conservation directly to the people. Each exhibit is designed and arranged to depict the animals and habitat of the section in which it is shown.

In order to keep up with the constant demand for pictures of all kinds for its publications; as well as for others; this division employs a full-time photographer and has installed a modern dark room, completely equipped, for processing and printing its films.

The Louisiana Wildlife Museum, located at Commission Headquarters, 400 Royal Street in New Orleans, has become famous for its exhibits and has gained worldwide comment from visitors from almost every part of the globe. Tourists, school children, scientific writers and ornithologists all agree as to the beauty of its lifelike displays which show most of the animals against backgrounds featuring their native flora.

The division is also in charge of maintaining the wildlife museum which is located on the first floor of the headquarters building at 400 Royal Street in New Orleans.

Since it was opened, after having been removed from the old Presbytere on Jackson Square, the exhibits have attracted widespread attention and visitors from all over the globe have accorded them universal praise.

The rejuvenating of the museum's specimens have occupied curator Edouard Morgan and his assistant more than two years to complete and are now to be seen in a bright, clean cases, against backgrounds of foliage native to their habitats.

The museum is open to the public from 9:30 a.m. to 4:30 p.m. each day of the week, including holidays, with the exception of Mondays. There are to be seen the ivory-billed woodpecker, now believed to be extinct; the extinct Passenger Pigeon and rare birds such as whooping cranes, trumpeter swans and hundreds of other forms of bird, and reptile wildlife; also a fine exhibit of bird eggs.

The present museum had its beginning after the St. Louis World's Fair of 1902 when the state found itself with a wonderful collection of specimens illustrating its archeology, history, flora, fauna and minerals that the "Louisiana Purchase Exposition" had gathered and exhibited at the fair. It had these on its hands at the fair's closing.

On the instigation of Governor Newton Blanchard an appropriation was made by the legislature and the exhibits were brought back and housed in New Orleans. The specimens of the wildlife fauna in the original exhibit have been enormously added to and improved in the intervening years.

The migratory waterfowl section of the Wildlife Museum, which depicts ducks and geese in flight, is one of the popular features of the exhibits on display.

It has been estimated that the New Orleans Vieux Carre attracts more than two million visitors each year. The Louisiana Wildlife Museum, which is housed here in the Wildlife & Fisheries building is rapidly becoming a focal point for tourists from all parts of the world.

Two new birds have been added to the museum; both asiatic imports to Louisiana. They are the red junglefowl and the black francolin.

In connection with the museum a new acoustically treated auditorium is maintained which seats 300. There visiting groups, at their request, are shown wildlife sound, black and white and color motion pictures.

This service is in connection with the film lending library which is maintained by the division. Here films are held in readiness for shipment all over the state to schools, sportsmen's clubs, civic organizations, youth organizations, and in fact, anywhere the voice of wildlife conservation may be heard to advantage.

During the past biennium the division has purchased several prints of color-sound films produced by nationally known educational film experts.

Records reveal that more than 260,000 people viewed natural resource films distributed or shown by the Wild Life and Fisheries Commission. In addition, hundreds of thousands viewed Commission films loaned to the state's television stations.

One of the many extra services is the maintenance of a special filing system in which are kept clippings of pertinent articles in wildlife publications throughout the United States and from all parts of the globe.

This filing system is regarded as a mecca by students and newsmen seeking short and concise sources of immediate information on wildlife, not only in Louisiana, but also elsewhere whether it be concerning the ardvark or the zebra.

Although its inception has been relatively small in comparison to the field which it must eventually embrace; we must quote the Chinese proverb, "A voyage of a thousand miles begins with one step."

This division also checks all local and state daily newspapers and publications and keeps a statewide file on articles originated by our department and elsewhere. These files are kept in scrapbook form. This method also affords a check of publisher acceptance of our news releases.

During the past biennium we have originated many publicity programs that have aided our people who are engaged in the harvesting of our wildlife, such as oysters, furs and shrimp, crawfish, and other natural crops.

Wildlife Education

JOE HERRING

Proper management, protection and utilization all are important as we endeavor to improve and perpetuate Louisiana's Wildlife resources.

It then becomes obvious that the "Wildlife story" of Louisiana should be told to our present and future leaders. As a step in attaining this end, the Louisiana Wild Life and Fisheries Commission established the education program.

Many individuals and groups including state and federal agencies have cooperated in seeing the "wildlife education" program get underway. The State Department of Education has cooperated in every way and has made available personnel and resources of that department for helpful assistance in many phases of the statewide undertaking.

The program adopted by the Commission, and initiated in August of 1960 called for Wildlife Instructors, who would visit schools, service and civic clubs, sportsmen's groups and other organizations interested in hearing the fabulous wildlife story. The instructors are equipped with motion picture projection machines, slide projectors, wildlife films, mounted and preserved wildlife specimens, and other visual aid equipment and wildlife literature.

Principle objective of the educational program is to present to the youth of Louisiana the full work and activities of the Wild Life and Fisheries Commission; and the economical, social, recreational, and aesthetic values that will be derived from personal knowledge of the states wildlife resources.

The program has the primary objective of assisting school teachers, upon request, in supplying both visual and verbal knowledge of Louisiana's vast and important natural resources to their classes. Teachers may secure such wildlife programs by contacting wildlife instructors from the Commission's district offices by mail or telephone. These are located in Minden, Monroe, Alexandria, Ferriday, DeRidder, Opelousas, Baton Rouge and New Orleans.

The question and answer periods, after a lecture, pertaining to Louisiana's wildlife resources are always of interest. Interest is so great that the length of programs has been reduced so that longer question and answer periods can be conducted.

Wildlife instructors not only meet with school groups but with civic groups, sportsmen's groups, church groups, scouts, and other clubs and organizations interested in conservation and the full appreciation of wildlife resources.

Many subjects such as history, civics, geography, math and others may be integrated into a wildlife program. To study geography what could be more interesting than to study the states by waterfowl flyways. History could not have been made without wildlife. Early settlers came seeking furs and buffalo once roamed Louisiana.

Teaching the wise use of our wildlife resource opens to our students an opportunity for a richer life. Citizens have more leisure time today than ever before and are seeking outlets for this time. Be it hunting, fishing, boating, water skiing, camping, hiking, bird watching or just going to the woods, one may well be a better citizen if he knows how to wisely utilize his time for recreation.

Conservation clubs have been formed in many of the States' schools. Throughout the state we find many of our schools encouraging students to form conservation clubs. Principals, teachers and counselors find that through conservation clubs students become more familiar with our state and our national natural resources. Students, through clubs, take part in extra curricu-

Students and teachers of Louisiana schools get an excellent opportunity to study Louisiana wildlife resources at the Commission marine research laboratory located on historic Grand Terre adjacent to the fishing village of Grand Isle.

lar activities pertaining to wildlife resources.

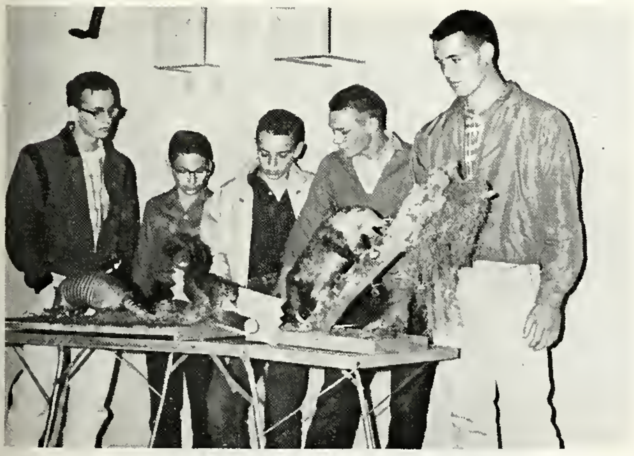
The leaders feel that the club serves several purposes for members. The purposes are (1) that during the impressionable period of life, students learn the proper procedure for group action and participation, (2) students develop the practice of meeting together, combining their own ideas for the purpose of solving problems, (3) students prepare programs and keep abreast of wildlife activities within our State, and (4) students learn of the natural laws at work in the outdoors which leads to an active appreciation of natural resources and their practical values, and this in turn to a desire to manage them wisely.

The Educational Section has one weekly television program over KLSE-TV, Louisiana State Department of Education Educational Station in Monrce and one monthly program over KALB-TV in Alexandria, Louisiana. The weekly program over KLSE-TV is titled "The Biology of Wildlife" and the monthly program over KALB-TV discussed the current events of Louisiana's Wildlife program.

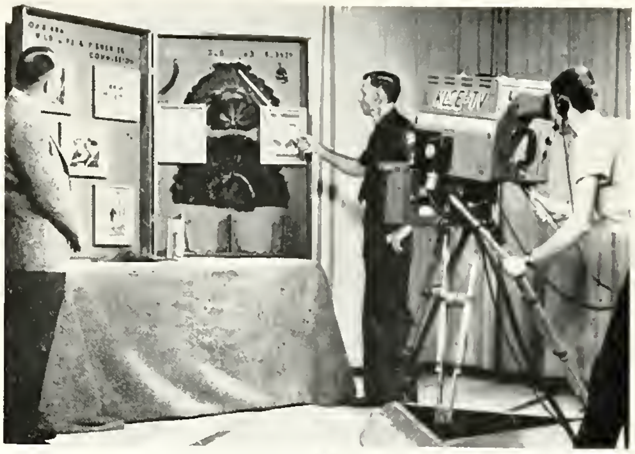
Emphasis has been placed on safe gun handling by the Education Section. During the summer months "Firearm Safety" Clinics are conducted. By conducting these clinics many youngsters are taught the proper use and methods of handling firearms.

During this period the Educational Section has published sixty five booklets pertaining to Louisiana Wildlife resources. These booklets have been very popular in the States' schools, by sportsmen and outdoor enthusiasts.

Instructors are called upon from various parishes to put up displays on the wildlife resources of our state for fairs and festivals. Some 25 displays are set up each year for such events. This number does not include displays for conventions and other meetings where instructors are requested to place displays.



Members of the Houma Junior High Conservation Club looking over some of the Wildlife specimens prepared by Glen Picou, far left. Conservation, taxidermy and other phases of out door activities are discussed in clubs.



Wildlife Instructor Dick Wall and Cliff Williams, Biologist District II Supervisor discusses turkey and turkey management over KLSE-TV Louisiana State Department of Education, educational station.

Clyde Harrison, Biologist and Supervisor of District III, Louisiana Wild Life and Fisheries Commission, conducting a field trip on the Red Dirt Game Management Area for the Louisiana Natural Resource Workshop. Teachers from all areas of the state participated in this workshop.

Another important job of the Wildlife Instructor is the answering of correspondence to the school students of our state. Teachers assign students various subjects pertaining to our natural resources. These students in turn write to the Louisiana Wild Life and Fisheries Commission for information to use in preparing their work. Many of these letters require individual attention if they are to be answered correctly. Others are answered with printed material. Approximately 375 letters per week are answered on request basis.

Not only are letters received from students and other citizens of our state, but requests for information on Louisiana Wildlife resources are received from around the world.

Instructors are presently averaging 301 programs per month, with an average monthly attendance of 10,791 students. This total includes elementary and secondary schools with a few college classroom lectures.

Enforcement Division

REORGANIZATION of the law enforcement division of the Commission took place during the past two years; modern mobile transportation and communication programs were effected and a better understanding of fish and game laws by the public began to take place.

Boosted by a network of powerful towers and additional mobile units, working on a round the clock basis, would be violators were discouraged both on land and on water.

The achievements of the Law Enforcement Division during the past two years, are too numerous to mention although many have received national and local acclaim in the various news media. The pernicious practice of fish shocking, at night, has been one of the forms of violation upon which the game agents have concentrated. Fish shocking looms important when one considers it from many angles; most important is the bad example that it might set among legitimate commercial and sports fishermen. Both of these groups detest these latter-day pirates who, without investment in fishing gear and armed with dynamos and electrodes take the fish the "easy way" and ruin the fishing of certain species for both of the legitimate groups. It is natural that these latter would look to our Law Enforcement Division to put an end to such practices. Hence the concentration in stamping out fish shockers who just aren't "playing the game" by anyone's rules.

To cite just one case in point in order to demonstrate how these miscreants will flaunt the law armed with the confidence in their high speed boats, we quote from the front page of the Franklin, Louisiana Banner-Tribune of October 11, 1963, which says, in part:

"A Franklin (W.L.F.) agent leaped on a boat capable of running 60 miles an hour to nab three men in the Charenton Drainage Canal and charged them with shocking fish.

"The agent, acting on a tip, had gone to the canal and found the three men near a railroad bridge with a shocking aparatus made from an old-fashioned wall-type telephone. The agent leaped into the boat and told the men they were under arrest. One of them tossed the shocking device overboard, and it was later recovered. The pilot of the boat at first refused to stop in his attempt to start the boat, however, he was overcome by the agent.

"The agent said that the three men had a 100 horsepower motor mounted on a ten-foot fiberglass hull capable of attaining a speed of 60 miles per hour and that our department had nothing to match it and that only a fortunate combination of circumstances, plus the tip from legitimate fishermen, enabled him to make the arrest.

"The game agent reported that he found the men with 94 pounds of catfish and asserted that in addition to the danger posed to the fishing industry by the shocking of fish, a boat and motor of the type he confiscated present a hazard to human life because of their high speed."

Sometimes arrest situations produce "lame" explanations that would jar the truth. Two agents working the Pearl River area, looked up to see a hunter coming out of the woods with a filled tow sack over his shoulder. The agents surmised that the man must have gone over his limit of squirrels. Upon checking his license and bag,

LEONARD C. NEW
Chief

J. L. BOOK
Asst. Chief

LESMA HEBERT
Wildlife Agent IV

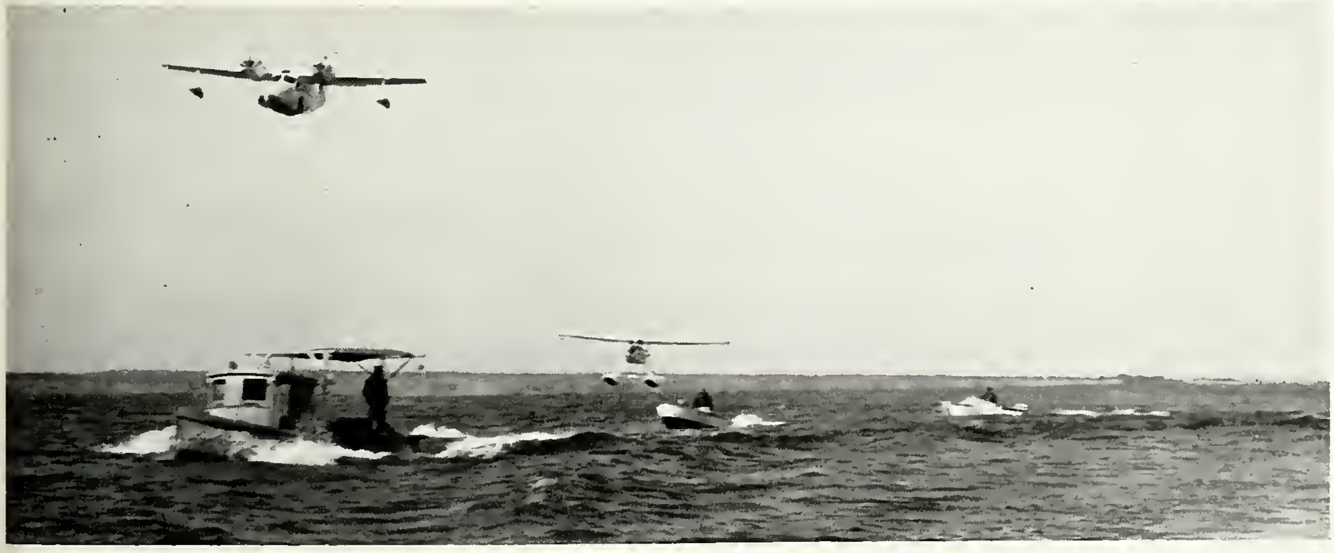
DEWEY L. FARRAR
Wildlife Agent IV

they found a big turkey gobbler inside. The hunter blurted out, "You caught me red-handed." "There I was taking dead aim at this squirrel and you know, this big turkey just flew in the path of my shot." The agents filled out their arrest report and informed the hunter that the turkey season would not be open until five months hence.

Another arrest, among other unusual ones was the apprehension of a party who was shipping illegal alligator skins to Japan. Alligators, according to recent laws, are limited to size and also to season. Due to Louisiana's dwindling alligator population and worldwide demand for our animals because of the superiority of their hides the Commission has made every effort to allow the saurians to make a comeback.

During middle October of 1963 information was obtained that undersized alligator skins were being shipped out of state without a license and to Japan. Agents made an undercover investigation and obtained the information that a barrel containing 91 skins was being shipped to Tokyo from the First Street Wharf in New Orleans and that there had been other shipments and a traffic in the hides to the orient was being established. The illicit cargo was seized and the traffic was ended. The aforementioned volunteered information points to the fact that the example set by our enforcement Agents has been winning public support to the cause of conservation in our state.

During the past year the Enforcement Division has redistricted the state. There are now



This is a photograph of a typical operation by which the Enforcement Division protects our young shrimp from out of season poachers. Above we see the patrol planes which have spotted the illegal trawling operation. They have observed the trawler and notified the two patrol boats by radio to walkie-talkies of the location of the violator and the agents close in to make the arrest. Such operations have made violations extremely unprofitable not only to shrimp law violators but also to others seeking to break the state's fish and game laws.

eight districts, instead of sixteen. This was brought about in order to have closer supervision of the Agents. In doing this, each Wildlife Agent IV is now supervising two districts. They are Dewey L. Farrar, in charge of District I and III, Jim Parker, in charge of Districts II and IV, Lesma Hebert in charge of Districts V and VIII, and Charles Ventrella in charge of Districts VI and VII.

The eight districts are each supervised by an Agent III. They are: E. L. "Jack" Stanfield, Harvey Christian, Earl Nugent, Wm. Gillespie, Jr., James Ellis, Leroy Seal, Jimmie Hairford and Frank Trocchiano.

Each district is comprised of several parishes. They are as follows:

District I

Bossier, Bienville, Caddo, Claiborne, DeSoto, Red River, and Webster.

District II

East Carroll, West Carroll, Morehouse, Union, Lincoln, Ouachita, Richland and Jackson.

District III

Natchitoches, Winn, Sabine, Grant, Vernon and Rapides.

District IV

Madison, Caldwell, Franklin, LaSalle, Catahoula, Tensas and Concordia.

District V

Beauregard, Allen, Calcasieu, Jeff Davis, Cameron, Evangeline, Acadia and Vermilion.

District VI

Avoyelles, Pointe Coupee, W. Baton Rouge, Lafayette, St. Landry, St. Martin and Iberville.

District VII

West Feliciana, East Feliciana, St. Helena, E. Baton Rouge, Livingston, Tangipahoa, Ascension, St. Tammany and Washington.

District VIII

Assumption, Iberia, Lafourche, St. Mary, Terrebonne, St. James, St. John, St. Charles, Jefferson, Orleans, St. Bernard and Plaquemines.

A majority of Louisiana's 64 parishes now have an Agent II supervising the Agent I's. There are 48 Wildlife Agent II's.

In addition to the above personnel there are also 124 Agent I's, 6 Laborer Utilities, 1 Investigator, 6 Boat Captains and 4 Deckhand.

An additional 45 new trucks and two-way radios have been purchased and distributed. These trucks along with the state autos enables each parish in the state to be equipped with a state vehicle and two-way radio.

All state radio towers are now being operated from 5 AM until 8 PM, seven days a week. This has proved helpful to the agents that needed assistance during the recent Still Hunting deer season. The time spent operating the radio towers also proved helpful during the recent drought.

CHARLES VENTRELLA
Wildlife Agent IV

Due to the fact that the Louisiana alligator population has dwindled, coupled with the fact that the state's saurain hides are considered superior and are in demand all over the globe, laws have been passed to protect the animals. Nevertheless, poachers are on the increase and agents of the Law Enforcement Division are ever on the alert to apprehend the law breakers.

JIM W. PARKER
Wildlife Agent IV

Since the passage of the small boat registration law the Enforcement Division has trained its boat registration agents to render first aid and also in innumerable ways to render assistance to boat operators. Here we see agents being taught emergency first aid techniques, including the newest methods of resuscitation, treatment of burns and shock, and assistance which may be given until professional medical aid can be secured for the victim. Agents are seen, above, learning traction splinting of a simulated victim's broken leg.

TYPES OF VIOLATIONS

	1962	*1963*
Angling without a license	511	451
Angling without non-resident lic.	76	
Commercial fishing without a lic.	57	62
Selling turtles without lic.	....	....
Selling crabs without lic.	....	....
Selling fish without lic.	25	9
Poisoning fish	3	....
Electrocution of fish	52	63
Fishing game fish illegal tackle	52	74
Fishing commercial fish illegal tackle	32	45
Fishing with explosives	4	....
Commercial fishing in closed season	2	3
Trawling without license	25	24
Trawling without permit	....	....
Trawling with net over 50 feet	....	....
Trawling with double trawl	....	....
Trawling for crabs	....	....
Trawling in illegal trawl	3	....
Trawling in sanctuary	8	8
Seining in sanctuary	10	1
Trawling in closed waters	71	57
Trawling at night	9	2
Seining in closed waters	12	....
Possession of undersize fish	45	77
Possession of over the limit game fish	54	....
Possession undersize shrimp	59	81
Possession game fish for sale	10	8
Possession of undersize crabs	1	2
Blocking stream	18	10
Illegal taking oyster (bedding ground)	....	....
No oyster license and/or tags	....	....
Pollution of stream	....	....
Hunting without license	102	140
Selling squirrel	....	....
Possession over limit squirrel	14	1
Possession illegal killed rabbits	7	....
Possession over limit rabbits	3	....
Hunting rabbits in closed season	30	18
Selling rabbits	6	3
Killing doe deer	55	39

TYPES OF VIOLATIONS

	1962	*1963*
Possession of illegal deer meat	51	24
Possession of wild ducks	1	....
Possession of over the limit mig. waterfowl	68	22
Hunting mig. waterfowl illegal hour	49	16
Selling migratory waterfowl	6	....
Hunting mig. waterfowl in closed season	114	86
Hunting mig. waterfowl with no stamp	9	16
Hunting mig. waterfowl in baited pond	2	10
Hunting from power boat	72	48
Hunting doves in closed season	21	9
Hunting doves in baited pond	4	13
Possession of over limit doves	....	11
Hunting with unplugged gun	50	37
Hunting on State Preserve	16	6
Hunting at night	330	437
Hunting & killing over limit wood ducks	....	3
Hunting & killing wood ducks in closed season	1	....
Hunting quail in closed season	4	19
Hunting snipe in closed season	3	2
Hunting & killing grobec	10	....
Hunting rails in closed season	2	11
Hunting & killing cranes	....	....
Hunting & killing robins	9	65
Hunting & killing heron	10	1
Hunting woodcocks illegal hours	....	3
Hunting woodcocks in closed season	3	15
Hunting without a non-resident lic.	2	1
Hunting frogs illegal gig	2	4
Possessing frogs in closed season	22	2
Hunting frogs in closed season	39	36
Hunting frogs with gun	18	7
Hunting squirrel in closed season	126	107
Hunting deer in closed season	77	120
Hunting deer in closed parish	15	2
Hunting deer no tag	38	52
Hunting turkey in closed season	6	55
Hunting & killing hen turkey	2	....
Hunting turkey no tag	1	....
Hunting turkey in baited pond	2	6
Hunting on public road	1	....
Hunting fur-bearing animals with gun	3	1
Killing bear in closed season	....	3
Trapping without a license	10	10
Trapping out of season	11	3
Trapping on State Preserve	....	....
Buying furs without license	1	1
Taking alligators in closed season	22	20
Possessing undersize alligators	21	11
Camping on Refuge	2	28
Setting fire on State Refuge	1	....
Operating hunting club no lic.	....	....
Resisting arrest	8	3
Failing to return permit on specified time	....	....
Water skier with 1 person in boat	....	17
Operating motorboat—reckless	6	5
Operating motorboat—no lights	27	18
Operating motorboat—unregistered	129	58
Operating motorboat—insufficient L/S/D	285	2
Hunting killdeer in closed season	2	....
Fishing on Refuge	8	....
Operating boat no fire extinguishers	14	....
Trespassing on Refuge with firearms	32	10
Hunting off State Hwy.	....	8
Hunting off Federal Hwy.	....	6
Possession undersize oysters	....	2
Parole violation	....	1
Operating motorboat w/o life preservers	....	150
Trespassing on Refuge	....	46
Hunting doves illegal hours	....	10
Killing bear in closed season	....	1
TOTAL	3,124	2,788

CONVICTIONS IN LOUISIANA PARISHES

Parishes	*1962*	*1963*
Acadia	33	30
Allen	67	60
Ascension	55	55
Assumption	68	36
Avoyelles	130	54
Beauregard	49	18
Bienville	23	54
Bossier	8	50
Caddo	11	24
Calcasieu	64	52
Caldwell	37	36
Cameron	100	65
Catahoula	52	18
Claiborne	8	2
Concordia	73	51
DeSoto	35	26
East Baton Rouge	4	24
East Carroll	12	2
East Feliciana	6	16
Evangeline	39	42
Franklin	38	21
Grant	20	33
Iberia	80	62
Iberville	175	154
Jackson	11	6
Jefferson	111	93
Jefferson Davis	32	21
Lafayette	25	12
Lafourche	150	132
LaSalle	45	15
Lincoln	9	12
Livingston	12	40
Madison	18	78
Morehouse	34	31
Natchitoches	27	42
Orleans	77	29
Ouachita	8	5
Plaquemines	61	39
Pointe Coupee	87	60
Rapides	36	45
Red River	11	9
Richland	58	59
Sabine	10	9
St. Bernard	75	97
St. Charles	88	74
St. Helena	2	7
St. James	50	47
St. John the Baptist	54	64
St. Landry	100	109
St. Martin	96	60
St. Mary	81	35
St. Tammany	87	55
Tangipahoa	16	62
Tensas	69	74
Terrebonne	204	165
Union	11	8
Vermilion	40	35
Vernon	10	10
Washington	38	30
Webster	7	41
West Baton Rouge	63	68
West Carroll	4	4
West Feliciana	12	6
Winn	8	5
TOTAL	3,124	2,788

Above are Wildlife Agent III's whose combined service totals more than 125 years. Left to right are, James F. Ellis, District V; Frank Trocchiano, District VIII; E. L. Stanfield, District I; Earl H. Nugent, District III; Leroy Seal, District VII; Wm. Gillespie, Jr., District IV; Harvey Christian, District II. (Not in the picture is Jimmie J. Hairford, Wildlife Agent III.)

FINES

	1962	*1963*	*Total*
Jail Sentence	54	39	93
Jail Sentence Suspended	9	35	44
Nolle Prose	140	160	300
Prosecution Declined	40	11	51
Not Guilty	23	17	40
Fine Suspended	39	87	126
Minor	13	22	35
On Probation	45	41	86
Case Dismissed	57	24	81
License revoked 1 year	5	21	26

	1962	*1963*
Fines collected in District Court	$42,502.10	$34,937.50
Fines collected in Federal Court	$12,327.50	$14,215.00

CASES

	1962
Hunting & killing wood ducks in closed season	1
Hunting quail in closed season	4
Hunting snipe in closed season	3
Hunting & killing grobec	10
Hunting rails in closed season	2
Hunting & killing cranes	0
Hunting & killing robins	9
Hunting & killing heron	10
Hunting woodcocks illegal hours	0
Hunting woodcocks in closed season	3
Hunting without a non-resident lic.	2
Hunting frogs illegal gig	2
Possessing frogs in closed season	22
Hunting frogs in closed season	39
Hunting frogs with gun	18
Hunting squirrel in closed season	126
Selling squirrel	0
Possession over limit squirrel	14
Possession illegal killed rabbits	7
Possession over limit rabbits	3
Hunting rabbits in closed season	30
Selling rabbits	6
Killing doe deer	55
Possession of illegal deer meat	51
Hunting deer in closed season	77
Hunting deer in closed parish	15
Hunting deer no tag	38
Hunting turkey in closed season	6
Hunting & killing hen turkey	2
Hunting turkey no tag	1
Hunting turkey in baited pond	2
Hunting on public road	1
Hunting fur-bearing animals with gun	3
Killing bear in closed season	0
Trapping without a license	10

CASES (Continued)

	1962
Trapping out of season	11
Buying furs without license	1
Taking alligators in closed season	22
Possessing undersize alligators	21
Camping on Refuge	2
Setting fire on State Refuge	1
Resisting arrest	8
Operating motorboat—reckless	6
Angling without a license	511
Angling without non-resident lic.	76
Commercial fishing without a license	57
Selling fish without license	25
Poisoning fish	3
Electrocution of fish	52
Fishing game fish illegal tackle	52
Fishing commercial fish illegal tackle	32
Fishing with explosives	4
Commercial fishing in closed season	2
Trawling without license	25
Trawling in illegal trawl	3
Trawling in sanctuary	8
Seining in sanctuary	10
Trawling in closed waters	71
Trawling at night	9
Seining in closed waters	12
Possession of undersize fish	45
Possession of over the limit game fish	54
Possession undersize shrimp	59
Possession game fish for sale	10
Possession of undersize crabs	1
Blocking stream	18
Hunting without license	102
Possession of wild ducks	1
Possession of over the limit mig. waterfowl	68
Hunting mig. waterfowl illegal hour	49
Selling migratory waterfowl	6
Hunting mig. waterfowl in closed season	114
Hunting mig. waterfowl with no stamp	9
Hunting mig. waterfowl in baited pond	2
Hunting from power boat	72
Hunting doves in closed season	21
Hunting doves in baited pond	4
Possession of over limit doves	0
Hunting with unplugged gun	50
Hunting on State Preserve	16
Hunting at night	330
Operating motorboat—no lights	27
Operating motorboat—unregistered	129
Operating motorboat—insufficient L/S/D	285
Hunting & killing deer in closed season	2
Fishing on Refuge	8
Operating boat no fire extinguishers	14
Trespassing on Refuge with firearms	32

John Paul Culpepper and Kinsey Martin of the Louisiana Wild Life and Fisheries Commission demonstrate to a group of youngsters in Monroe, the proper and safe way to cross a fence while hunting. As may be noted Paul is holding the two guns while Kinsey crosses the fence.

Fur Division

TED O'NEIL
Chief

LOUISIANA'S FUR INDUSTRY, once participated in by some 20,000 skilled trappers, and amounting to a 15 to 20 million dollar economy, has had many setbacks, however, due to factors for improvement foreseen by those participating in the industry, the picture at the present gives great promise.

One of the most stabilizing factors in recovery has been the promotion and development of the nutria fur and the use of the meat of the animals as ranch-mink and pet food. This demand for the total utilization of the nutria has proven a bonanza for the trappers who had been weaned away from their dedicated lifetime avocations due to hard times and high wages offered by the oil and other allied industries.

It is foreseen that the next two or three seasons will find more trappers seeking furbearing animals throughout the state. Preparations are being made and enthusiasm is on the increase.

One of the reasons for the aforementioned is that heretofore, when trapping muskrats during the peak production years, those engaged in harvesting of this species were limited to approximately 1,000,000 acres of prime muskrat marshlands.

However, with the advent of the exotic nutria on the scene, the land area picture has been greatly enlarged. In anticipation of the return to better times fur and meat handling facilities are being constructed at highway junctions and along the bayous. This we see as a prediction of increased confidence in the industry. There is evidence to indicate that in the near future even more of the state might be trapped for furbearing animals whose pelts and meats are finding a ready market.

This will increase income for more people and added revenue for the state. In other words "new money" coming into Louisiana from New York and European dealers in furs. Aside from the upswing in total revenue to the state, there are other side beneficial factors expected to come to light following the coming trapping seasons.

One of these will be marked increase in trapping of predators which have been left alone to a great extent in years past and are now at an all-time high in populations, statewide trapping will result in the harvest of a number of predatory furbearers, with beneficial effects on small game and game bird populations.

Clear indication of this statewide interest in trapping is seen in the fact that the Louisiana supply of traps at present has been sold out. Wholesalers are depleted and back orders for traps are reported from dealers all over the state.

The present healthy outlook for Louisiana furs can be attributed to several factors. Foremost, perhaps, is the consumer demand for fur linings and fur trimmed garments.

Another important reason is that the Louisiana nutria is regarded with more respect in our state than it formerly was. Nutria is described as the "backbone" of the present state fur industry as is indicated by new $2,000,000 value recorded for the 1962-63 crop.

The Louisiana Wild Life and Fisheries Commission has stood by its guns that nutria could become an important segment of the fur and allied industries. In spite of opposition and scepticism, in some quarters, the commission has long pointed out the value of the animals not only for their furs but also for their meat. Recently another interesting sideline developed in south

Louisiana's two important fur-bearers Muskrat and Nutria "Case stretched" for curing.

Texas in the Federal Government's Screw Worm Eradication program. So far, more than 6,000,000 pounds of nutria meat has been used on this project. As we have said before, unlike muskrats, nutria can be obtained from approximately 20,000,000 acres of state lands. The Muskrats are conversely concentrated on approximately 1,000,000 acres of prime marshlands.

The muskrat area consists principally of brackish coastal marsh where three-corner grass supplies the animals with their main food. This area supports roughly 85 percent of the entire muskrat population of Louisiana.

Nutria offer broad uses in the fur industry. The pelts dye well and are highly respected in the trade. For many years they have been considered a quality fur, on a par with Beaver and Mink.

Multiple use in garment manufacture and trim give nutria a wider price range than muskrat; with prices of the fur easily adjusted in keeping with their use. Nutria have proved more adaptable for different garment use, lending well to plucking and shearing for garments calling for that process. Nutria are also desirable as "long hair" furs, unplucked and slightly sheared.

This present boom in the fur industry was activated by the Fur Division with the support of several landowners, big dealers, and fur dressers and dyers who began the operation in Louisiana with 25,000 pelts and a few hundred dollars to promote the project of dressing, dying, and eventually manufacture in our state. The project has been eminently successful thus far and some of the colors produced in the furs were unbelievable.

Perhaps one of the basic reasons for the feeling that Louisiana's fur industry can be stabilized, and not fluctuate as much as 100 percent from one trapping season to another, is the fact that its nutria fur production is stable and the pelts are reasonably priced. It will remain so if proper legislation is passed as recommended by the Louisiana Wild Life and Fisheries Commission. One of these changes would be the removal of the nutria from the present outlaw list.

In the gathering of raw nutria pelts by trapping there are not likely to be abrupt changes in the supply, as in the case of muskrats. Nutria will survive well in greatly diversified terrain. The animals are hardy and almost indifferent to climatic changes. The one exception to the aforementioned being in the event of severe freezes. Such a condition has occurred twice in the past two years wiping out large percentages of the animals where cover was not available.

As we said in the beginning, nutria meat plays an important part in this industry as an adjunct to the incomes of the trappers. Nutria is being quick frozen and finding a ready market. An estimated 18,000,000 pounds reached the market in the past two trapping years.

A fur buyer examining Raccoon pelts, hanging on the wall are several Lynx pelts. The Fur Division is doing several things with Louisiana Lynx which looks very promising for the future.

The size of these animals lends their carcasses to profitable utilization, thus providing trappers with the proverbial "two cracks at the same ball". The trappers are able to sell the pelts and also the meat, adding to their income. This freezing of nutria is an expanding industry, capable of processing all of the raw meat available to it. In addition to bolstering the income to the trapper, it has increased the scope of freezing operations, filling-in during the winter months when sea-food freezing is slow.

Most important, perhaps, it assures continued trapping of nutria resulting in the availability of pelts. A certain source of supply is paramount with fur dealers and buyers, and is of prime concern to the garment industry. Without a continued and assured source of supply, promotional activities by the garment and fur industry are not to be expected.

In the highly competitive and fickle fur industry, assurance of a fur supply is a "must" before promotion begins. This is particularly true of the Raccoon, as for an instance before the current cloak trade promotions, (collars, trim and hat) industries began their promotion of Raccoon they waited for a number of years until a large quantity of Raccoon furs had been built up in storage. Then they purchased the entire stock and Raccoon pelts which flowed into the hands of garment manufacturers, resulting in one of the hazards of the fur trade for the 1963-64 season, namely overpricing the raw product. This brought a sharp halt to the manufacturing of the item, resulting in a dead market, and again the stockpiling of cheaper raccoon pelts. These cheaper pelts are presently being "eyed" by a new European market and Canada. Any country can start a Raccoon trim and collar craze among school girls at any time they so desire. There are thousands of American school girls who still crave a Raccoon collar, but at a "price". Just ask a few. This is reflected in the price brought by Raccoon pelts during the past four trapping seasons. The pelts brought a dollar each in 1958-59, then climbed 50 per cent to $1.50 each for the past three trapping seasons (1959-60, 1960-61, and 1961-62). And to $1.80 in 1962-63. It is expected that Raccoons will continue to be trapped this season. Here again, the furbearer's carcass has played an important part, as Raccoon meat finds a ready market for human consumption.

A study of figures for the past two decades shows that muskrats have decreased greatly in numbers, reaching a 2-year low in 1962-63. The 346,647 muskrat pelts officially recorded for 1962-63 trapping season shows a great tapering off from the 8,337,411 pelts taken during the 1945-46 trapping season.

Nutria failed to reach the 100,000-pelt mark until the 1953-54 trapping season. During the decade when nutria pelts could be counted only in the tens of thousands, muskrat pelts began to plummet from the high of 1945-46 to a 21-year low last season.

Trappers were quick to blame the increasing populations of nutria for the decline in the number of muskrats; however, close scrutiny of facts and figures reveals that while localized nutria were building up to the 100,000-pelt mark; the great muskrat population plummeted.

A great deal of misunderstanding arose about the nutria in Louisiana. For the record, it should be pointed out that the muskrat peak was the 1945-46 season when 8,337,411 rats were trapped, bringing trappers $1.50 each. In that same season only 8,784 nutria were taken in areas near their Avery Island release point. The peak population of muskrat had so depleted their food supply, that there was no other way for them except down.

Louisiana today is at the point when this relatively new furbearer has reached a sustained peak from a production standpoint. The opportunity now exists for the Louisiana Wild Life and Fisheries Commission, land owners, trappers, fur dealers, fur processors and others to appraise themselves of facts about the fur industry in order that they will be in a position to manipulate and engage in management practices so that the state will be able to maintain a steady production of both muskrat and nutria.

It now appears that both of these aforementioned burbearing animals have reached a degree of stability and occupy an important part in the general economy of the State.

By management practices, there is every assurance of a renewable supply of both muskrats and nutria. Recent activities in the fur industry plainly show that the State has permanently added to its rich fur resources and the general and widespread benefits will continue for decades, thus employing a larger part of the entire fur industry in the form of fur dressing plants and manufacturing of finished garments.

It is a fact that Louisiana is lucky and most fortunate to produce two basic furbearing animals with amazing reproductive capacities. These are well known and respected throughout the world.

ALLIGATORS

The 1958 Legislature passed the first measures toward the protection of the Louisiana Alligators; prohibiting the taking of animals under (5) feet in length, and authorizing the Louisiana Wild Life & Fisheries Commission to set season, methods, and areas where and how they might be taken.

The Commission allowed the taking of alligators from April 15th to June 15th, 1961 in South Louisiana—starting from the Louisiana-Texas line Highway 90 to Iowa Highway 165, to Forest Hill Highway 112 to Lecompte Highway 71, to Krotz Springs Highway 190, to Slidell and Highway 11 to the Mississippi line. Alligators are protected in all areas of the State North of this line.

A 60x60 enclosure with a 15 by 60 ft. area for sepaating various sizes. This enclosure is located on hard clay soil. The hurricane fence is placed in concrete that extends 20 inches into the ground. The burrowing moat is located 10 feet from the fence to prevent digging out. This pen contains 40 gators ranging in size from 5 to seven feet in length. The Owner reports that there is very little disturbance in pen as long as feeding is regular. Separating for size is necessary as larger animals will swallow the young occasionally when being fed. When food is short there may be some cannibalism.

Hunters, Dealers, and Buyers of Alligator skins were notoriously unhappy with the 1958 law. Dealers and buyers appeared during the 1962 legislature asking for a change and agreed on a short season but a size limit of 3′ to 7′ in lengths, making it prohibitive under 3′ or over 7′. The Trades bill was passed over opposition from the Wild Life & Fisheries Commission.

In making a last ditch stand in an attempt to conserve the State's dangerously low, and dwindling, alligator population, the bill was vetoed; the law reverting back to the original 5′ and up-ruling. It will have to be admitted that the results have been fair to good. Dealers from Japan, France, Germany, Mexico and within the United States have been besieging trappers offering unheard of prices for our alligator hides, which are known the world over to be the very finest skins to be had.

It seems that when you push Louisiana in one place it always comes back in another with renewed energies and this attests to the versatility and resourcefulness of its marsh and swamp people. At present we witness a rapidly growing alligator farming industry. This industry primarily started as an expression of defiance to the size limit low. Farming allows the handling of small gators, giving the participant a more secure feeling, with the pretence of staying within legal bounds. But "lo and behold" two important things have happened. The farm operators immediately became attached to their friendly reptiles and, secondly, found that with normal feeding two or three times a week during the warm months, with scrap fish heads, nutria carcasses, or other ready available foods, the young 'gators' would grow a foot or better a year. At $4.00 per foot the operators found themselves in a profitable business quite by accident, as has been the case in many businesses.

In just a few months the number of alligator breeders has jumped from nothing to 20 and many others are making feverish plans to start. Even those animals that escape, which will be many, will have been cared for in captivity and allowed to reach a much more profitable size before reaching the skin trade.

COMPARATIVE TAKES OF FUR ANIMALS IN LOUISIANA

Approximate Price at Point of Severance

1944-1945 Season

Muskrat	5,963,156	@	$ 1,23	$ 7,334,681.88
Nutria	902	@	.50	451.00
Mink	132,821	@	4.05	537,925.05
Raccoon	176,911	@	1.15	203,447.65
Opossum	66,000	@	.50	33,000.00
Otter	1,912	@	6.00	11,472.00
Skunk	11,155	@	.50	5,577.50
Fox	5,124	@	.50	2,562.00
Cat	628	@	.50	314.00
Miscellaneous	86	@	.50	43.00
TOTAL	6,358,695			$ 8,129,474.08

1945-1946 Season

Muskrat	8,337,411	@	$ 1.50	$12,506,116.50
Nutria	8,784	@	5.00	43,920.00
Mink	168,598	@	15.00	2,528,970.00
Raccoon	244,502	@	1.50	366,753.00
Opossum	90,433	@	.50	45,216.50
Otter	2,367	@	20.00	47,340.00
Skunk	12,224	@	1.00	12,224.00
Fox	3,823	@	.50	1,911.50
Cat	1,430	@	.50	715.00
Miscellaneous	37	@	.50	18.50
TOTAL	8,869,609			$15,553,185.00

1946-1947 Season

Muskrat	8,029,764	@	$ 1.00	$ 8,029,764.00
Nutria	18,015	@	3.00	54,045.00
Mink	153,027	@	5.00	765,135.00
Raccoon	186,750	@	1.50	280,125.00
Opossum	77,264	@	.60	46,358.40
Otter	2,832	@	12.50	35,400.00
Skunk	4,830	@	.50	2,415.00
Fox	2,645	@	.50	1,322.50
Cat	383	@	.50	191.50
Miscellaneous	53	@	.50	26.50
TOTAL	8,475,563			$ 9,214,782.90

1947-1948 Season

Muskrat	5,794,317	@	$ 1.50	$ 8,691,475.50
Nutria	28,176	@	3.00	84,528.00
Mink	153,120	@	15.00	2,296,800.00
Raccoon	126,933	@	1.00	126,933.00
Opossum	31,744	@	.70	22,220.80
Skunk	1,415	@	.70	990.50
Otter	5,078	@	18.00	91,404.00
Fox	2,528	@	.50	1,264.00
Cat	70	@	.50	35.00
Miscellaneous	679	@	.50	339.50
TOTAL	6,144,060			$11,315,990.30

1948-1949 Season

Muskrat	2,948,281	@	$ 1.10	$ 3,243,109.10
Nutria	26,738	@	3.50	93,583.00
Mink	91,541	@	8.00	732,328.00
Raccoon	104,034	@	.70	72,823.80
Otter	2,222	@	12.00	26,664.00
Opossum	23,713	@	.50	11,856.50
Skunk	1,144	@	.50	572.00
Fox	1,727	@	.50	863.50
Cat	222	@	.50	111.00
Wolf	6	@	.50	3.00
Miscellaneous	759	@	.50	379.50
TOTAL	3,200,387			$ 4,182,293.40

1949-1950 Season

Muskrat	2,195,324	@	$ .77	$ 1,690,399.48
Nutria	38,988	@	3.00	116,964.00
Mink	123,850	@	8.90	1,102,265.00
Raccoon	73,035	@	.27	19,719.45
Opossum	16,361	@	.20	3,272.20
Otter	2,968	@	8.00	23,744.00
Skunk	302	@	.15	45.30
Fox	226	@	.15	33.90
Cat	87	@	.15	13.05
Miscellaneous	142	@	.15	21.30
TOTAL	2,451,283			$ 2,956,477.68

1950-1951 Season

Muskrat	2,477,464	@	$ 1.25	$ 3,096,830.00
Nutria	78,422	@	4.65	364,662.30
Mink	184,552	@	12.93	2,386,257.36
Raccoon	104,420	@	.43	44,900.60
Opossum	27,308	@	.21	5,734.68
Otter	4,801	@	12.15	58,332.15
Skunk	1,006	@	.15	150.90
Fox	1,250	@	.25	312.50
Cat	58	@	1.05	60.90
Miscellaneous	41	@	.15	6.15
TOTAL	2,879,322			$ 5,957,247.54

COMPARATIVE TAKES OF FUR ANIMALS IN LOUISIANA (Continued)

Approximate Price at Point of Severance

1951-1952 Season

Muskrat	1,011,202	@	$ 1.09	$ 1,102,210.18
Nutria	77,966	@	2.00	155,932.00
Mink	95,784	@	9.39	899,411.76
Raccoon	89,353	@	.55	49,144.15
Opossum	18,017	@	.24	4,324.08
Otter	4,849	@	11.00	53,581.45
Skunk	1.062	@	.34	361.08
Fox	1,181	@	.45	531.45
Cat	35	@	.25	8.75
Miscellaneous	33	@	.28	9.24
TOTAL	1,299,482			$ 2,265,514.14

1952-1953 Season

Muskrat	1,247,705	@	$ 1.15	$ 1,434,860.75
Nutria	89,526	@	2.00	179,052.00
Mink	113,073	@	10.00	1,130,730.00
Raccoon	63,429	@	.50	31,714.50
Opossum	12,114	@	.20	2,422.80
Otter	4,198	@	11.00	46,178.00
Skunk	982	@	.50	491.00
Fox	377	@	.25	94.25
Cat	21	@	.50	10.50
Miscellaneous	2	@	.15	.30
TOTAL	1,531,427			$ 2,825,554.10

1953-1954 Season

Muskrat	1,173,209	@	$ .80	$ 938,567.20
Nutria	160,654	@	2.00	321,308.00
Mink	58,706	@	8.50	499,001.00
Raccoon	49,857	@	.50	24,928.50
Opossum	6,344	@	.25	1,586.00
Otter	3,884	@	13.00	50,492.00
Skunk	311	@	.25	77.75
Fox	86	@	.25	21.50
Cat	5	@	.25	1.25
TOTAL	1,453,056			$ 1,835,983.20

1954-1955 Season

Muskrat	1,383,114	@	$ 1.10	$ 1,521,425.40
Nutria	374,199	@	2.05	767,107.95
Mink	65,170	@	15.00	977,550.00
Raccoon	84,223	@	.75	63,167.25
Opossum	7,497	@	.35	2,623.95
Otter	5,407	@	16.00	86,512.00
Skunk	120	@	.50	60.00
Fox	31	@	.50	15.50
Cat	542	@	.40	216.80
TOTAL	1,920,303			$ 3,418,678.85

1955-1956 Season

Muskrat	1,821,840	@	$ .80	$ 1,457,472.00
Mink	57,142	@	11.00	628,562.00
Raccoon	61,520	@	.90	55,368.00
Otter	4,653	@	18.00	83,754.00
Nutria	418,772	@	1.00	418,772.00
Opossum	6,211	@	.15	931.65
Fox	185	@	.25	46.25
Skunk	273	@	.20	54.60
Cat	102	@	.25	25.50
TOTAL	2,370,698			$ 2,644,986.00

1956-1957 Season

Muskrat	1,589,433	@	$ .80	$ 1,271,546.40
Mink	62,872	@	7.00	440,104.00
Raccoon	72,522	@	1.00	72,522.00
Otter	5,261	@	16.00	84,176.00
Nutria	543,160	@	1.50	814,740.00
Opossum	5,056	@	.15	758.40
Fox	76	@	.25	19.00
Skunk	526	@	.20	105.20
Cat	31	@	.25	7.75
Miscellaneous	2	@	.25	.50
TOTAL	2,278,939			$ 2,683,979.25

1957-1958 Season

Muskrat	2,165,723	@	$ .80	$ 1,732,578.40
Mink	61,377	@	6.00	368,262.00
Raccoon	75,048	@	.90	67,543.20
Otter	4,382	@	14.00	61,348.00
Nutria	510,679	@	1.00	510,679.00
Opossum	11,194	@	.15	1,679.10
Fox	25	@	.25	6.25
Skunk	478	@	.20	95.60
Cat	200	@	.25	50.00
Miscellaneous	2	@	.20	.40
TOTAL	2,829,108			$ 2,742,241.95

1958-1959 Season

Muskrat	1,302,606	@	$ .80	$ 1,042,084.80
Mink	88,365	@	8.00	706,920.00
Raccoon	68,139	@	1.00	68,139.00
Otter	5,166	@	14.00	72,324.00
Nutria	461,311	@	1.00	461,311.00
Opossum	3,660	@	.10	366.00
Fox	33	@	.25	8.25
Skunk	623	@	.15	93.45
Cat	126	@	.25	31.50
TOTAL	1,930,029			$ 2,351,278.00

1959-1960 Season

Muskrat	1,531.788	@	$ 1.20	$ 1,838,145.60
Mink	58,838	@	8.00	470,704.00
Raccoon	80,814	@	1.50	121,221.00
Otter	5,559	@	18.00	100,062.00
Nutria	694,110	@	1.10	763,521.00
Opossum	9,498	@	.25	237,450.00
Skunk	524	@	.25	131.00
Fox	123	@	.50	61.50
Cat	252	@	.50	126.00
TOTAL	2,381,506			$ 3,531,422.10

1960-1961 Season

Muskrat	961,287	@	$ 1.10	$ 1,057,415.70
Mink	32,272	@	7.00	225,904.00
Raccoon	65,588	@	1.50	98,382.00
Otter	3,602	@	17.00	61,234.00
Nutria	716,435	@	1.00	716,435.00
Opossum	11,450	@	.40	4,580.00
Fox	165	@	.50	82.50
Skunk	388	@	.40	155.20
Cat	39	@	.50	19.50
TOTAL	1,791,226			$ 2,164,207.90

1961-1962 Season

Muskrat	632,558	@	$ 1.20	$ 759,069.60
Mink	41,399	@	7.00	289,793.00
Raccoon	109,470	@	1.50	164,205.00
Otter	4,195	@	16.00	67,120.00
Nutria	912,890	@	1.25	1,141,112.50
Opossum	16,662	@	.40	6,664.80
Fox	192	@	.50	96.00
Skunk	464	@	.40	185.60
Cat	41	@	.50	20.50
TOTAL	1,717,871			$ 2,428,267.00

1962-1963 Season

Muskrat	346,647	@	$ 1.60	$ 554,635.20
Mink	51,316	@	7.50	384,870.00
Raccoon	160,218	@	1.80	288,392.40
Otter	8,484	@	17.00	144,228.00
Nutria	1,357,806	@	1.35	1,833,038.10
Opossum	20,157	@	.50	10,078.50
Fox	553	@	1.00	553.00
Skunk	465	@	.50	232.50
Lynx	110	@	2.00	220.00
TOTAL	1,945,756			$ 3,216,247.70

Nutria Meat	8,000,000 lb.	@	10¢	$ 80,000.00
Raccoon Meat	300,000 lb.	@	15¢	4,000.00
Opossum Meat	30,000 lb.	@	15¢	450.00
				$ 84,450.00

Fish and Game Division

A PROGRESSIVE and successful business in this scientific age depends largely upon research and development. Profit making organizations spend millions of dollars each year in improving or developing better products. As one company's motto "Progress Is Our Most Important Product," stands out to let the public know that they are striving for better equipment and materials for the public use.

The general public accepts advancements in science and new products without too much opposition. The majority of this public has been exposed to the technique of manufacturing the products and the development of sciences and are only capable of doubting the results after a trial and error period. As an executive of one of America's leading industries once said "only five percent of our companies' research pays off but it is that five percent that keeps us in business."

Such is the case with wildlife research and development. Without the various phases of your Louisiana Wild Life and Fisheries Commission a successful product could not be manufactured because of a missing link. Each division, Enforcement, Refuge, Game and Fish, Fur, Oyster and Waterbottom, Water Pollution, Education and Publicity play their role in putting together your product "WILDLIFE." Each division has a working part to carry out with their well trained technicians and field personnel. The Fish and Game Division is actively engaged in a very broad research and development program.

Activities of this Division during the past two years were directed toward the improvement of fishing and hunting opportunity through research, development, management and habitat preservation. Progress means advancement. In the case of this division's responsibilities, it means the application of the best management procedures available to provide the maximum fishing and hunting opportunities commensurate with the preservation of the fish and wildlife species. This requires two basic functions in view of the statewide rapidly changing ecological conditions in the upland, bottomland, marsh and water areas. One is the uninterrupted services of competent fish and wildlife technicians who have been trained to observe, measure, record and report the results of applied projects. The other is the implementation of approved practices and management of fish and wildlife according to research findings applicable to the various sets of conditions.

JOE L. HERRING
Chief

A major effort has been extended by the Division in attempting to obtain more reasonable and equitable regulations on all species of migratory game birds. During the 1963-64 seasons effort was rewarded by longer seasons on doves, waterfowl, snipe and woodcocks. Bag limits were also increased. This has been some of the dividends paid for research.

Several information type bulletins on the game and fish species of Louisiana were published during this period. Emphasis was placed on informing the sportsmen of activities pertaining to fish and game management practices. Through such efforts the public will have a better understanding of reasons for any deer season's animal population fluctuations and other factors. One major publication on fish pond management was prepared and published during this period.

Over the two year period the fish and game division cooperated in the construction of public boat ramps over the state. A site was purchased for construction of the Opelousas District VI office and other building of this division were maintained in good order.

KENNETH SMITH
Assistant Chief

Fish and Game Division is divided into six major sections. Detailed reports on the various activities of this Division's sections follow this general and very brief introduction.

TRAP DEER BY AIR!

In mid-April of 1963 the Louisiana Wild Life and Fisheries Commission successfully carried out a deer restocking program that has aroused national interest. The three-day trapping experiment in the Louisiana marshes proved so successful that plans are being considered to repeat the operation again within a year.

The restocking project involved live-capture of 104 deer for restocking in accordance with long-established Commission policy of putting deer in good range where there is no deer hunting allowed and no deer present in order to build up huntable populations.

The program which has aroused the interest of other state wildlife commissions involved the use of a helicopter, air boat, and a commission-owned light plane.

Deer captured were taken in groups of four by helicopter to waiting boats and shuttled to trucks for immediate transportation to predetermined areas for restocking.

The 104 deer were taken from both state and federal refuges. Operations on the Delta National Wildlife Refuge, a federal refuge at the mouth of the Mississippi River, were carried out by commission personnel. Carl Yelverton, U. S. Fish and Wildlife Service, assisted in that part of the operation involving the Delta National Wildlife Refuge.

The bulk of the program was participated in jointly by personnel of the Commission's refuge division, fish and game division, and the enforcement division.

Directed by Richard K. Yancey, assistant director of the Commission; personnel includ Allan Ensminger, Clark Hoffpauir, Robert Murry, Dan Dennett, Robert Chabreck, Kennet Smith and Benny Loga.

As the deer were moved inland to areas wher restocking areas had been selected, wildlif agents of the enforcement division assisted i liberating deer which had been captured. Sinc liberation, agents will carefully watch the nucleu of future deer herds. Under close protection huntable herds will be built up in those area where there were no deer prior to the restocking program.

The deer were driven into grassy cover o waterways by the helicopter or air boat an quickly captured by personnel aboard. The project proved to be the most economical and efficient ever used. It is estimated that deer taken in the three-day period were obtained at an average cost of not more than $10 each.

One important beneficial result of the program was that it allowed Commission personnel to select doe deer and young deer that are most desirable for restocking purposes, rather than old bucks. These are best suited for a restocking program and accelerated expansion of herds being established.

The recent live-capture of deer is part of the overall program to put deer in virtually every parish in order to complete establishment of a statewide deer herd. However, no deer were placed in areas where deer populations already exist.

Cooperation of the public in the areas where deer were released for restocking will greatly help the program and assure increased deer hunting in future years.

The Wild Life and Fisheries Commission in April of 1963 successfully trapped and transplanted more than 100 deer from state and federal refuges near the mouth of the Mississippi River. The deer were captured by use of a helicopter, an air boat, and a commission - owned - airplane. Deer were taken in groups of four by helicopter to waiting boats and shuttled to trucks for immediate transportation to other areas of the state.

River Basin Section

Fish and Wildlife resources are products of land and water and are dependent on wise use of natural areas for their survival. Future production of these renewable natural resources is contingent upon the preservation of suitable habitat for their growth and reproduction.

The program of wetlands habitat preservation has been continued for the past two years and has reached a high level of coordination throughout the various groups associated with this type of activity.

Our fish and game species require abundant food, cover and space for continued and sustained levels of production. The availability of high quality habitat is of vital importance to the future maintenance of fish and animal populations at levels of production which will benefit the thousands of hunters, fishermen and trappers throughout Louisiana. The preservation of bottomland swamps, coastal marshes and other wetland areas in a natural state holds the key to continuous yields of all forms of fish and wildlife resources.

It is the purpose and responsibility of the River Basin Section to coordinate, investigate and evaluate all proposed water control projects in Louisiana to determine whether or not these projects will be detrimental to our fish and game resources. Upon finalization of these studies, reports including recommendations are prepared and submitted to the various agencies, governmental authorities and other groups associated with the project. Generally, all projects pertaining to water control or use have some effect on fish and wildlife. Occasionally small or more limited projects in low quality areas have little or no effect on fish and game of the region. However, in most situations various project modifications can be incorporated into a program which minimizes or eliminates damages to wildlife. These modifications are usually designed to preserve natural habitat conditions. Still other projects offer no practical method of protecting or enhancing fish and wildlife interests. This is normally the case when rights-of-way and actual project construction destroy existing habitat. In some instances there are both direct and indirect losses to fish and wildlife through the cumulative effects of a project. This adverse effect may be experienced over several months or several years depending on the location and scope of the project.

When projects are requested by local interests and approved for study by the appropriate authority, regardless of the final outcome, every effort is made to cooperate with the planning agency to delete or minimize fish and game losses. This may be accomplished by various recommendations, and coordinated measures detailing project alignment, spoil placement and control, and modification of project construction features that will be less harmful and in some instances beneficial to fish and wildlife resources.

MAX W. SUMMERS
Supervisor

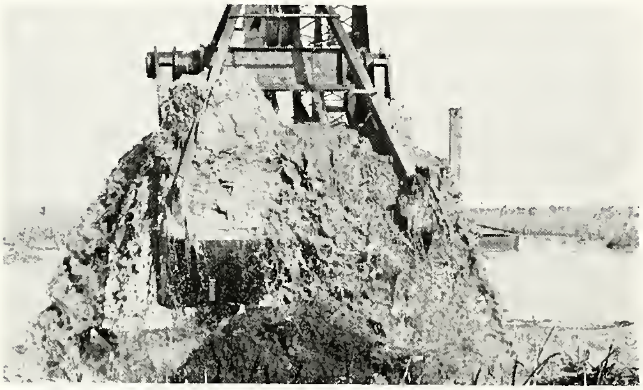
The Louisiana Wild Life and Fisheries Commission as well as other governmental agencies concerned with fish and wildlife conservation and management, are cognizant of the need for various water control projects to provide for the nation's industrial and economic growth. However, we also recall the history of previous water control projects and remember that little if any significance was placed on the value of fish and wildlife resources and the economic benefits associated with these natural assets.

The actual fish and wildlife losses attributed to past water control projects is staggering and has resulted in a wide decline in many areas, of the overall recreational potential by eliminating the previously abundant fish and game populations. Subsequently, these valuable wildlife resources suffered irreplaceable losses which are and will continue to deprive our citizens of an age old heritage, namely the availability of hunting and fishing opportunities. It would not be correct to say that none of these projects should have been built, but rather to indicate that most of the damages to fish and wildlife could have been avoided with adequate foresight, planning and the combined efforts of all interests involved.

In our scramble for economic diversification and expansion we have placed more and more emphasis on the utilization of submarginal land areas and as a result of these intensified programs a pronounced change has occurred in the natural ecological regimen of these lands which previously were ideally suited to the production of our resident fish and game animals. This is not a new problem for the trend has been developing for the past 30 years. It is particularly alarming to the agencies charged with the responsibility of protecting, enhancing and promoting our fish and wildlife resources by the fact these water projects are annually eliminating areas which normally produced fish and wildlife. The destruction of habitat by adversely effecting the ecology of an area through drainage, flood control or navigation projects has greatly reduced fish and wildlife populations. Now, in the face of increased human populations more and more demands are being placed on fishing, hunting and outdoor recreation in general. We must now take steps necessary to insure against further losses of our recreational outlets by installing measures that will eliminate or at least curb the annual destruction these projects do to our important fish and game populations. The need for developing a more comprehensive and multipurpose approach to all aspects of water control and use is apparent. All interests must have a common understanding regarding the many problems associated with water use projects and all should recognize the economic importance of developing our natural resources and give them equal consideration when planning such projects.

The development of interests and appreciation for fish and wildlife problems by all groups is undoubtedly the most important work which can be performed by this agency in meeting and discharging its responsibilities. It is of prime importance to keep all cooperating agencies and interested persons or groups completely informed on all aspects of fish and wildlife requirements and the possible long range effect all water control projects will have on fish and wildlife resources.

Louisiana is made up of extensive swamps, coastal marshes, bottomland and lowland areas, in fact almost one-third of its total acreage is considered as wetlands type of habitat. Generally the major portion of this wetland area is utilized by fish and game animals. The preservation of this habitat in a natural state is essential since all future production of fish and wildlife is dependent on satisfactory environmental conditions. It is not generally recognized that a single drainage, water control, navigation or flood control project constructed in an area can affect large tracts of land, water bottoms and water bodies and these effects are exhibited by change in the area's natural ecological charter. The plants and animals of an area are directly influenced by changes in their environmental conditions which may be brought about by the construction of various project features. A sudden and drastic change in the ecological regimen of an area spawns immediate changes in the plants and animals living in a previously natural environment. Any reduction of habitat by altering an area's natural character leads to a decline of the area's capacity to produce and support fish and wildlife. This condition gets steadily worse until a complete deterioration of the natural productiveness of an area is finally reached. The future production of fish and wildlife is dependent upon suitable environmental conditions in order for them to live, reproduce and maintain their numbers. The lack of adequate habitat will most assuredly cause a wide spread decline in fish and game abundance. This condition will be felt throughout Louisiana by the thousands and thousands of resident hunters and fishermen. These are the people who are getting short changed by the destruction of fish and wildlife habitat. Once a project is constructed and the damage to our fish and game is done the cost to restore or rectify this condition is insurmountable, consequently fish and wildlife suffer losses that cannot be replaced. Even if it were economically feasible to restore or replace fish and wildlife it would not be possible to use all the project area because the habitat has usually been altered so that the productive capacity for fish and wildlife is lost and can never be completely restored. Thus, prevention of damage and destruction to fish and wildlife range and water habitat is the only practical way to preserve and continue these valuable natural resources. Whenever a project



Construction of canals, channels, and water control measures has destroyed countless acres of fish and wildlife habitat. The result of the above dragline operation can have a very harmful effect on fish and wildlife resources.

Channelization projects, similar to the above, have drastically altered the natural ecological characteristics of many acres of prime fish and wildlife habitat in the marshes of Coastal Louisiana.

is formulated and approved for construction it should be an established purpose of the project to provide sufficient funds to the appropriate agency for the rehabilitation of suitable lands or the acquisition of additional lands equal in area and value to that of the area damaged or destroyed. This would allow for the continued production of fish and wildlife in sufficient numbers to provide continued utilization by hunting and fishing interests.

During the past two years a continued shortage of personnel along with increased work loads and responsibilities has necessarily confined our efforts primarily to the major water control projects. This does not mean the numerous other small projects were unimportant, to the contrary, the total effects of these projects is of considerable importance, but with our limited personnel we just could not give these smaller works proper coverage. This is not a new problem but it is an ever increasing one. Our fish and wildlife resources are steadily being reduced by public works projects which do not recognize the value of these natural assets. Unless trained and experienced personnel are available to give coverage to this area of responsibility this condition will persist and will become more critical as time goes by. We need additional funds and competent personnel to review and study all water control projects so a more representative appraisal will be made of the real importance of fish and wildlife resources.

The following will briefly summarize the various projects studied, reviewed or continued by the River Basin Section during 1962-63.

BARTARIA BAY WATERWAY PROJECT

This project is scheduled for completion by the end of 1963 and has been described in earlier biennial reports. The combined efforts of the River Basin Section of the Louisiana Wild Life and Fisheries Commission and the Branch of River Basin Studies U. S. Fish and Wildlife Service were instrumental in re-aligning this project to avoid some high quality oyster producing areas which would have otherwise been destroyed.

BAYOU LAFOURCHE AND LAFOURCHE JUMP WATERWAY PROJECT

This project as authorized in 1935 provided for permanent closure of the head of Bayou Lafourche, without a Lock; a channel 6 feet deep and 60 feet wide from Napoleonville to the Gulf Intracoastal Waterway at Lockport; a channel of the same dimensions from the Gulf Intracoastal Waterway at LaRose to the Gulf via Belle Pass (that part of the Bayou between Lockport and LaRose was enlarged as a part of the 9′ X 100′ Gulf Intracoastal Waterway prior to its relocation from LaRose to Bourg) ; the closure of Pass Fourchon; and a jettied entrance at Belle Pass.

This project was modified by the Rivers and Harbors Act of 1960 to provide for a channel 9 feet deep and 100 feet wide from Golden Meadow to Leeville; a channel 12 feet deep and 125 feet wide from Leeville to the Gulf; a bypass channel 12 feet deep and 125 feet wide extending from the Gulf Intracoastal Waterway west of LaRose to Bayou Lafourche below Leeville; and a channel 12 feet deep and 125 feet wide from Leeville eastward through the Southwest Louisiana Canal, new land cuts and existing channel to connect with Bayou Rigaud section of the Barataria Bay Waterway at Grand Isle. This project is scheduled for completion in 1967.

This commission along with the U. S. Fish and Wildlife Service worked with the U. S. Army Corps of Engineers to minimize the possible damage this project will have on fish and wildlife resources of the area. Reports were filed with the Corps of Engineers detailing fish and wildlife interests and considerations.

CALCASIEU RIVER AND PASS PROJECT

Modifications to this project have been suggested by fish and wildlife interests to maintain the value of the area for shrimp and oyster production. This particular project has been described in detail in the last biennial report. It is scheduled for completion in 1967, initial construction was started in 1963.

FRESHWATER BAYOU PROJECT

This project began in 1963 and is slated for completion in 1965. Because this project is in a region of exceptional high value for fish and wildlife much effort and time was expended in reviewing and commenting on this project. Detailed reports by this agency, the U. S. Fish and Wildlife Service were submitted to the U. S. Army Corps of Engineers recommending certain project modifications and features which would best serve fish and wildlife interests.

OUACHITA AND BLACK RIVERS PROJECT

This previously very controversal project has been modified to include a diversion channel, control structure, and a dam in Little River to preserve Catahoula Lake as a prime waterfowl wintering area.

The project is still continuing and has been described in previous biennial reports. Both state and federal fish and wildlife agencies worked very hard to preserve Catahoula Lake and its excellent fish and wildlife habitat.

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT

After the disastrous flood of 1927 Congress enacted a comprehensive plan for flood control in the Lower Mississippi River alluvial valley by passage of the Flood Control Act approved May 15, 1928. This act has been subsequently modified many times. The last modification was passed in the Flood Control Act of 1960.

The Atchafalaya River Basin forms an integral and extremely functional part of the entire flood control project in the Lower Mississippi River Valley. The project provides for dividing one half of a project flood of 3,000,000 cubic of water per second equally between the Atchafalaya and Mississippi Rivers.

There is a current project being planned by the U. S. Army Corps of Engineers whereby a single deep channel will be developed in the Atchafalaya Basin from the head of Whiskey Bay Pilot Channel all the way to the Gulf of Mexico. This will be accomplished by dredging, scour action and various distributary channel closures so that the major portion of all flood water will be confined to this channel and be passed to the Gulf.

Fish and wildlife interests are very concerned with the proposed project and are working hard to make recommendations and offer planning assistance to safeguard the fish and wildlife resources within this extremely valuable river basin.

SMALL WATERSHED PROJECTS

Surveys and studies of Public Law 566 projects were reviewed and coordinated with the Soil Conservation Service during the past biennium. The most important of these were the Bayou Rapides Watershed Project, Bayou Boeuf Watershed Project, Bayou False Watershed Project, Seventh Ward Watershed Project and Bayou Blue Watershed Project. All but the latter of these projects are designed primarily for agricultural interests such as, flood control, irrigation, drainage and associated land improvements. The Bayou Blue Watershed Project has provisions for fish and wildlife as a project purpose. These projects are requested by local interests and if they merit consideration and approval by the State Soil Conservation Committee they are scheduled for study. If they are justifiable from an economic standpoint they are constructed and both the federal government and the local interest share cost in their construction and operation. The U. S. Fish and Wildlife Service as well as the Louisiana Wild Life and Fisheries Commission cooperates in the study of these projects to see if fish and wildlife can be benefited in any way by the project and to make sure these projects will not be harmful to fish and wildlife resources.

OTHER PROJECTS CONSIDERED

Several public hearings and special meetings were attended and statements representing fish and wildlife interests and requirements were presented. Some of these related to projects like the Sabine-Neches Waterway, Boeuf and Tensas Rivers and Bayou Macon Channel, Calcasieu River and Pass (Saltwater Barrier), Bayou Bartholomew, Lake Pontchartrain Hurricane Study and Mermentau River Navigation Project, these are Corps of Engineers flood control and navigation projects and are either being planned or constructed at this time.

There are several small watershed projects pending authorization for study, these are the Panama Canal — Conway Bayou project Ascension Parish, Bogue Lusa Creek Watershed Washington Parish, and Cameron Parish Watershed program. The latter of these projects is on land which is extremely high quality fish and wildlife habitat. This section is cooperating with the participating agencies and local groups to assist in planning for fish and wildlife protection and enchancement.

When reviewing the existing conditions and selecting a course of action economic facts more or less confine our efforts to the preservation and management of existing fish and wildlife habitat.

This is the only realistic and intelligent approach to solving the problems that confront fish and wildlife as a result of water control projects. There must be a more careful evaluation and study of future projects that effect fish and wildlife so that all interests are better served and to be certain that our citizens will be getting more benefits from their tax dollar. All too frequently single purpose projects detrimentally affect areas important to the production of fish and wildlife species. We believe in most cases this damage can be avoided by a multi purpose approach and extended coordination detailing all possible factors which may be harmful to fish and wildlife and altering these features so fish and wildlife may be spared and helped, if at all possible.

To meet and satisfy these problems we need highly trained technicians to evaluate, study and coordinate fish and wildlife interests in all projects that will change or alter the natural characteristics of the area involved. We must be prepared to discharge this responsibility and accept the added work load caused by larger and larger public work budgets. If it is of the utmost importance to maintain close surveillance on all water control projects and submit qualified evaluation and recommendation for the protection and enhancement of our important fish and wildlife resources.

HABITAT PRESERVATION SECTION

MAX W. SUMMERS
Biologist

One of the most important functions that can be performed by any conservation agency is the protection and preservation of natural areas which contributes to the growth and sustains the production of our resident fish and game species.

Nature has indeed been generous and endowed Louisiana with some of the most productive fish and wildlife acreage to be found anywhere. Vast bottom land swamps, coastal marshes, wide river flood plains and thousands of acres of wild overflow and backwater habitat produces some of the finest hunting and fishing available anywhere within the continental United States.

Such areas provide a substantial portion of the state's economy. Annual revenues associated with expenditures of the army of sportsmen for the pleasures afforded by hunting and fishing, approaches $125,000,000. It is estimated that by the year 1980 this figure will double because of the ever increasing interest of our citizens in this form of outdoor recreation.

These figures are based on current license sales and calculated expenses assigned to the purchase of equipment, supplies, travel and meals and lodging by people who, more than casually pursue fishing and hunting as a form of outdoor pleasure.

Equally as important to the overall economy of our state is the commercial aspect of valuable fish and wildlife resources. These commercial products constitute an average value of $56,000,000 annually. Commercial fisheries resources such as shellfish, shrimp, crabs, crawfish, both marine and fresh water fish are an important source of food and income for the state and the nation as well. Fur bearing animals add to the value of our commercial wildlife resources. This production and economic value is of national significance and should be of considerable importance when viewing the preservation and conservation of the natural areas which produce such wealth. It is very necessary to remember there is no general surplus of these products, sports wise or commercial wise, for difficulties are currently experienced in meeting present demands by the interests that use and enjoy these natural products.

Land and water use has constantly changed existing ecological conditions and water cycles and affected changes which caused our people to adapt to an altered and exaggerated physical environment.

Similarly our fish and wildlife populations have adapted to changes which occurred that lowered the quality and reduced the amount of habitat that normally produced annual fish and game yields that were more or less taken for granted. The tide has turned and as our society continues to progress at a breath taking pace cognizance must be taken of our dwindling fish and game habitat and immediate steps must be taken to prevent further and future destruction, of the natural areas which produce these important renewable resources.

We are fast approaching a cross roads of choice and our concept of progress must be tempered by an awareness of the values with which we are dealing. In our accelerated attempt to create a better place in which to live we are losing sight of a very important idea or more particularly an age old heritage of being able to go hunting and fishing as we please.

We must recognize the importance of outdoor recreation and the benefit it offers to our citizens. We must also recognize the value of our commercial resources which are products of natural environment and install measures which will assure continued high level of production and utilization.

A multi purpose approach must be employed when considering projects or works that effect other interests as well as the single purpose or primary consideration for which a new land use or water control project was devised.

The Louisiana Wild Life and Fisheries Commission is presently engaged in a program of habitat preservation and fish and wildlife management which will insure a future surplus of fish and game for our outdoor enthusiasts and commercial interests to use and enjoy for generations to come. We are cooperating with other agencies in planning and developing fish and wildlife interests and combining these important benefits into numerous public works projects.

We hope that public support and participation will be achieved to the maximum degree possible and that with increased understanding and approval of the hunting and fishing public we will be able to obtain equal consideration and win a place of equal status for fish and wildlife interests that are definitely influenced by all works which alter or change existing conditions necessary for the production and well being of our fish and game populations.

Annually there are numerous navigation, flood control and drainage projects which damage many hundreds and sometimes thousands of acres of high quality wetland areas that support extremely high fish and wildlife populations. The cumulative effect of these public works projects has a staggering detrimental effect on fish and game resources. It is these adverse effects that must be reduced to a minimum if we are to have continuing reserves of fish and wildlife that can support annual hunting and fishing pressure.

The total number of these projects is too numerous to mention in this report, but of necessity two of the major projects which effect fish and wildlife must be described in greater detail to indicate the significance of the effect these works have on fish and game within the project area.

The following paragraphs will relate the problems associated with these projects and the steps taken to prevent or minimize the harmful effects that will accrue to fish and wildlife resources as a result of the installation of various project features.

The grasses that grow on the Catahoula Lake bed during the late summer months are used by local people for hay and by waterfowl after winter rains set in and flood out the lake bed with a few inches of water.

OUACHITA-BLACK RIVERS NAVIGATION PROJECTS

For many years conservation minded people and the Louisiana Wild Life and Fisheries Commission have fought to maintain and preserve the natural and unique value associated with Catahoula Lake, located in central Louisiana. We are again faced with the task of fighting to preserve this vast fish and wildlife area. A project that had no thought of Catahoula Lake at its creation now threatens to jeopardize the existing conditions which makes this backwater, overflow lake one of the most important natural fish and wildlife areas in Louisiana.

The navigation project which will effect this area calls for the construction of a 9 foot channel on the Ouachita-Black Rivers from their junction with Red River north to Camden, Arkansas. This will be accomplished by a series of locks and dams at certain locations to provide for sufficient depths to maintain navigation on these water courses.

We are most concerned over lock and dam number 2 or the facility that will be installed near Jonesville, Louisiana. Much controversy has arisen over the location of this structure because of its effect on Catahoula Lake. If the lock and dam were built below the mouth of Little River, which serves as a distributary to Catahoula Lake, water levels would be permanently increased over the entire lake. This would have detrimental effects on waterfowl, sport, and commercial fishery resources now associated with the natural watering and dewatering cycles annually experienced in the lake area.

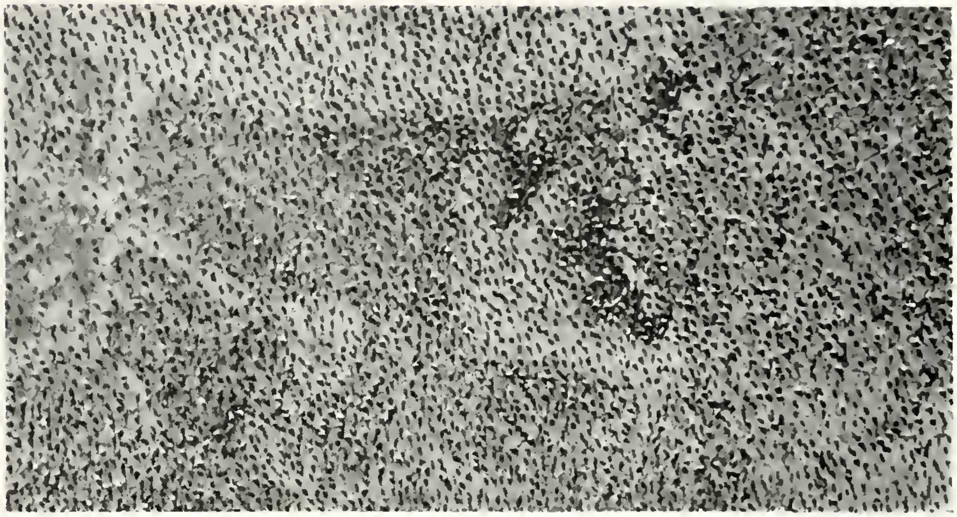
Stable water levels in Catahoula Lake would result in a deterioration of waterfowl habitat and utilization. Stabilization of water levels would eliminate low water stages necessary to produce vast beds of moist soil plants which are major food items of waterfowl. Impounding additional water by the installation of a lock and dam below Little River would alter existing ecological characteristics now associated with Catahoula Lake and would be very harmful to both fishery resources and waterfowl populations.

Various meetings were held with the U. S. Army Corps of Engineers, the planning and construction agency featuring this project, and the Federal Fish and Wildlife Service in an attempt to prevent losses to fish and wildlife resources of this important area. Numerous proposals were made to affect or minimize project occasioned damages to fish and wildlife. We finally arrived at a plan which was acceptable to all interests involved. The plan provided for a bypass channel from Catahoula Lake below the site of lock and dam number 2 which will permit continued water cycles on the same order as they now exist. It also calls for a water control structure in Little River to allow for a more accurate control of water levels in Catahoula Lake. This is a mitigation feature incorporated in the project designed to minimize damages to fish and wild-

Aerial photo of Catahoula Lake bed after it has been flooded by winter rains. A few of the 500 duck blinds normally constructed each year on the lake may be seen scattered about in this photo.

During some years as many as 4,000 cattle, such as those in this photo, have been observed on the Catahoula Lake Bed in the late summer after water levels have receded. These same flats are heavily used by waterfowl after being reflooded by winter rains.

Aerial photo of mallards and pintails in State Refuge located on Catahoula Lake. Normally 150,000 to 300,000 ducks winter on the lake. These birds feed on wild millet and chufa produced during the late summer when most of the lake bed has drained free of water. If Lock and Dam No. 2 is located below Jonesville, this wintering duck population can be expected to decline to about 15,000 and most of these will be divers.



life. Admittedly, fish and wildlife interests favored the installation of lock and dam number 2 above the mouth of Little River north of Jonesville. However, with continued cooperation and coordination of planning for primary project needs and fish and wildlife interests the fine qualities of Catahoula Lake can be maintained and managed for the good of fish and wildlife resources. Additional features are under consideration as other segments of this project and it is hoped all interests can be served by allowing for equal consideration of the values involved.

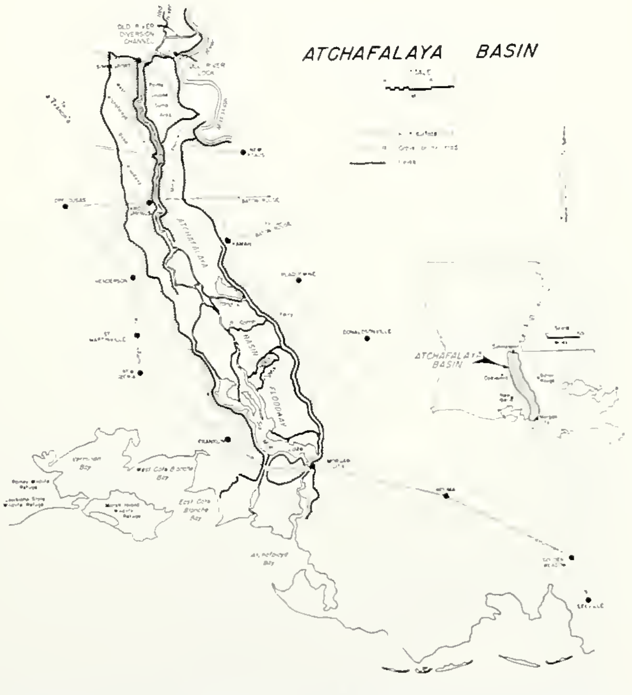
ATCHAFALAYA BASIN FLOOD CONTROL PROJECT

The Congress at the request of local interests, following the 1927 Mississippi River Flood authorized and directed the U. S. Army Corps of Engineers to develop and implement a comprehensive flood control plan to prevent flood occasioned losses to human life, livestock, and other valuable properties, both public and private. This broad program was authorized under the flood control act of May 15, 1928, and its subsequent acts, and is being implemented throughout the Lower Mississippi Valley in accordance with the urgency of the needs and with the availability of funds. Broad general measures having been applied to many segments of the overall system are now yielding to specific measures, such as evident in the Atchafalaya River Basin.

Here, flood protection works from an integral part of the U. S. Army Corps of Engineers projects aimed at controlling flood waters of the lower Mississippi River. At the latitude of Old River it has been determined that a maximum flood of 3,000,000 cubic feet of water per second can be expected and must be equally divided between the main channel of the Mississippi River and the Atchafalaya River System via the Morganza Floodway, West Atchafalaya Floodway and the main stem of the Atchafalaya River.

According to the Corps of Engineers land elevations due to siltation, have been increasing across the floodway and this is drastically reducing the flood carrying capacity of the lower spillway. In order to prevent further sedimentation and future loss of flood control capacity certain measures must be installed to provide for continued flood control.

These flood control proposals are aimed at creating a single deep channel through the swamps of the central Atchafalaya River Floodway from Big Alabama Bayou to the main body of Grand Lake near Morgan City. This is to improve flood-carrying capacity within the main river channel and lower Atchafalaya Basin. Also included in the project is the closure of certain existing distributary channels which will also help confine



The leveed Atchafalaya River Floodway comprises approximately 860,000 acres in South Central Louisiana.

the major portion of flood flows to a main channel.

The areas which are being surveyed for possible closure are: (1) Chicot Lake; (2) Logans Chute; (3) Bayou La Rompe, Bayou La Rose (plan A); (4) Butte LaRose Cutoff and Main Atchafalaya River at mile 64, (plan B); (5) The Main Stem at mile 61 (plan C) and; (6) The Main Stem below the head of Whiskey Bay Pilot Channel at mile 55 (plan D). All closures will be performed in conjunction with dredging operations to increase the flow of the main channel so that the silt carrying capacity of the main channel will be increased, thereby increasing the main channel "flow velocity". Thus, making maximum use of "scour action" to assist in enlarging the channel and moving silt toward Atchafalaya Bay.

Also being recommended by the District Engineer U. S. Corps of Engineers is the extension of the main River Levee from Big Alabama Bayou to Little Tensas Bayou. Also, there are four cross basin access routes to be left open for water distribution and navigation. These are: (1) Lake Long, Bayou L'Embrass; (2) Bayou Chene, Alligator Bayou on the west; (3) Upper Grand River, Little Tensas Bayou, and (4) Jakes Bayou, Bayou Sorrel on the east.

Water control structures have been recommended in the present project prepared by the U. S. Army Corps of Engineers and they would be located near Surburne on the east and Old Bayou Courtbleau on the west. These structures would consist of two 10′ x 10′ gated openings to provide for the introduction of river water into the east and west floodways. These facilities are to help mitigate project occasioned losses to fish and wildlife.

Plans for the lower reaches of the Atchafalaya River are not firmly established but it is indicated that dredging will be performed until a single channel is developed and enlarged to 100,000 square feet cross section and the spoil from this operation would be placed in low continuous banks wherever possible to assist further in confining flood flows to the maximum degree possible.

The vast Atchafalaya River basin and floodway system annually provides excellent fishing and hunting opportunity to many thousands of sportsmen from Louisiana and adjoining states.

These are Corps proposals and are currently being reviewed and studied to determine the most feasible and justifiable way to accomplish flood control within the Atchafalaya River Basin. According to the District Engineer any plan which will give flood discharge capacity 1,500,000 cubic feet of water per second in the lower Atchafalaya Basin Floodway will be satisfactory if it is economically feasible and engineeringly sound.

Fish and wildlife resources within the Atchafalaya River Basin are varied and of high quality. Habitat conditions are highly favorable for deer, squirrel, furbearers, waterfowl and upland game. The coastal marshes offer excellent win-

Numerous access points and launching sites within the Atchafalaya River Floodway allow for optimum utilization of this wilderness area by recreational interests.

ering grounds for migratory waterfowl and are excellent fur producing areas. Both sport and commercial fish thrive and maintain high yields throughout the Atchafalaya River Basin. The shallow waters of the coastal marshes provide valuable nursery areas for shrimp, crabs and commercial fish. Oysters are favored at times by conditions in which they grow and reproduce in quantities that make them a very important resource which adds greatly to the economy of this area. The quantity and quality of fresh water from the Atchafalaya River is of vital importance to the maintenance of salinities and nutrient levels necessary for continued production of fish, shrimp, oysters and other important commercial marine species.

Louisiana recognized the importance of this area to waterfowl and other wildlife and established two wildlife refuges in this coastal area. Marsh Island and State Wildlife are areas of national importance because they afford wintering grounds to thousands and thousands of ducks and geese coming down the Mississippi Flyway during fall migrations.

The influence on fish and wildlife in the Atchafalaya Basin will be readily noticeable in a very short time because the construction of any of the project features will bring about a relatively quick change in the hydrological and geological character of the river.

Channel enlargement will bring about widespread changes in the ecology of the entire project area. The reduction of sedimentation of the lower floodway would reduce the ponding of water and reduce the creation of additional waterfowl areas. The reduction of alluviation will be somewhat beneficial in that it will minimize timber die-off and tend to keep the large water bodies from filling in with silt.

Confining floodwaters to the main channel will reduce overflow conditions. This will reduce the production of sport and commercial fish and practically eliminate waterfowl utilization. As cross channels are closed and the main channel of the Atchafalaya River is made larger movement of the silt load into the Atchafalaya Bay area will result in a rapid deltaic formation. Mudflats will be built up over a wide area, this will cause a higher turbidity in the coastal waters of St. Mary, Iberia and Vermilion Parishes. Because of a westerly longshore current sedimentation will be widespread over the coastal bottoms of the parishes. These changes in present conditions will be detrimental to oyster production and the quality of the shrimp and marine fish nursery areas will also be lowered.

The above is a typical scene representative of the fishing opportunity offered by the 540,000 acre lower Atchafalaya River Floodway.

The levee extension, channel enlargement and channel closures either singularly or in any combination will have detrimental effects on the fish and wildlife in the Henderson and Ramah areas. The extension of the east river levee will immediately prevent overbank flow and subsequently reduce drastically backwater flooding necessary to maintain high fish and wildlife habitat in the middle and upper reaches of the floodway. The east levee and upper most channel closure extension would move the source of all back water downstream at least 18 miles in the east or Ramah area and at least 10 miles in the

In recent years access to the lower Atchafalaya River Floodway has improved so much that nearly all of this vast area can be reached by the hunting and fishing public.

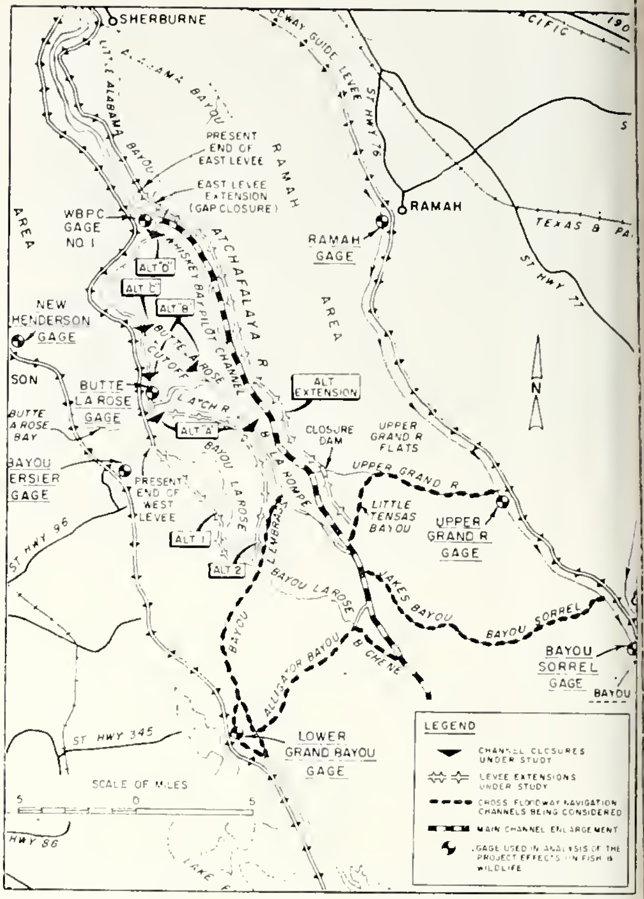
west or Henderson area. Immediate effects of the construction features would result in a reduction of the annual backwater stages necessary for fish and wildlife production by about 5 feet in the Ramah area removing 37,500 acres from backwater overflow and by about 4 feet in the Henderson area removing about 18,000 acres from backwater overflow.

The deposition of spoil from channel dredging to enlarge the main channel could have detrimental effects similar to that of the levees if it is placed in a continuous bank. This would act as a levee at the river stages occurring frequently enough to be of value for fish and wildlife. The spoil bank now occurring east of the Whiskey Bay Pilot Channel, for all practical purposes acts as a levee as far as fish and wildlife habitat is concerned. The effects of enlarging the channel to 100,000 sq. ft. would by itself have about the same detrimental effects as the levee extension in reducing stages in the Henderson and Ramah areas.

The considered levee extension in combination with the anticipated channel development due to dredging and scouring will shift the backwater flooding down the floodway to such an extent that the vast majority of the high value habitat for fish and wildlife in the Ramah and Henderson areas would be lost. Backwater stages that occur at a frequency often enough to be of importance to fish and wildlife resources would be reduced by at least 5 feet in the eastern side of the floodway and 6 feet in the western side. It is emphasized that because of the backwater reduction, we are concerned that the upper one third of the floodway would be subjected to conversion to land use not compatible with the flood control needs for which the Corps of Engineer built the floodway.

The closure of the Atchafalaya River by any of the alternate plans will result in reduced stages in the west floodway. Plan A will have the least detrimental effects on fish and wildlife and plans B, C, and D will be progressively more damaging. Plan A would reduce annual stages by 1.1 feet and B by 1.8 feet removing about 4,500 acres and 8,100 acres from annual flooding. The effects of plans C and D would be very much greater and would very closely approach the effect of the levee extension, which already has been detailed. Plan D after the main channel is enlarged should have the same detrimental effects on the Henderson Area as the combination of the levee and channel enlargement.

Because of the topography of the land in the Henderson and Ramah segments of the floodway relatively small changes in backwater stages can significantly reduce the area of overflow. In these areas each foot of reduction in backwater stages will directly remove an average of about 12,000 acres of prime habitat from the favorable influence of annual overflow necessary for fish and game production. So far most of the remarks have been directed to the effects on the frequency of overflow in the areas. However, it is emphasized that the annual duration of overflow at a given stage would similarly be reduced and this would be just as detrimental. It is pointed out that, and all should realize that, annual duration of overflow at a given stage is just as important or possibily more important for high fish and wildlife production as the frequency of overflow.



Flood control plans currently being considered in the Lower Atchafalaya River Floodway.

Recognizing the value and importance of fish and wildlife resources it is recommended that this and other similar projects give full consideration to the possibility of the federal government obtaining by acquisition in fee simple title lands comprising the project area and provide for their subsequent development for fish and wildlife and recreation purposes by federal, state, and local interests for maximum public use. In this way all land use will receive its full measure of developmental potential, and flood control projects can be aimed at a multi—rather than single interest approach.

This area is heavily utilized by people seeking outdoor recreation in the form of hunting, fishing and boating. This utilization will be reduced if adequate water access is not provided between the protection levees.

It is recommended that all possible lateral bayous and channels which are readily navigable be kept open so as to continue a high degree of utilization of this vast area by hunting and fishing interests and allow maximum participation and future development of this area in the interest of outdoor recreation.

The Louisiana Wild Life and Fisheries Commission will continue to work in behalf of fish and wildlife interests and discharge its responsibility to the people of Louisiana who derive pleasure and livelihood from these natural resources.

ENGINEERING AND CONSTRUCTION SECTION

WILLIAM E. ACKLEN
Engineer
EDDIE BENNETT
Draftsman

The Engineering Section of the Fish and Game Division has the responsibilities of maintaining and keeping in a good state of repair, all buildings and other properties of the Fish and Game Division.

Examples of work are buildings like the overnight cabin on the Russell Sage Game Management Area.

In the same area an equipment shed was constructed for housing the various types of equipment which are used on the Game Management Area.

This building has a work shop built in one portion and is wired for electric lights and power tools.

A similar type building was also constructed on the Thistlethwaite Game Management Area. This building was built on concrete pier foundation.

The Commission purchased approximately five acres of land located on Talton Street in the town of Minden, Louisiana on which the carpenter crew constructed an office building for District I Headquarters of the Fish and Game Division. This building consists of a large working room, a large reception room and five offices. On the same tract of ground there is a storage building.

The carpenter crew did major repairs on the DeRidder Office Building. This included partitions to make two additional offices to be used by the Education and Enforcement Divisions. There are also several wire partitions in an existing building to keep the various types of wild game. Wire enclosures in the vicinity of the buildings were also constructed.

The carpenter crew remodeled the interior of the Monroe building. Work was also done on the building located at District IV Office in Ferriday, Louisiana. They also constructed a large number of cabinets and book shelves in the Old Peabody Hall located on the Capitol Grounds and also the Fish and Game Office of the Wild Life and Fisheries Building in New Orleans.

A typical district headquarters installation that was designed and constructed by the engineering and construction section of the fish and game division.

They constructed a new 1,000 gallon water tank for the camp located on the Biloxi Marsh Public Hunting and Fishing area tract. The overnight cabin on Chicago Mills Game Management Area was replaced with a new foundation. They also constructed an equipment storage building on the Chicago Mills Game Management Area. The carpenter crew constructed a fence around approximately 320 acres of land belonging to the Wild Life and Fisheries Commission in East Baton Rouge Parish.

The carpenter crews constructed some new water drainage pipes at the Bayou LaCombe Fish Hatchery and also did some levee repairs. They built and distributed throughout the State a number of new deer traps in order that additional deer could be trapped for the restocking program. The Engineering Section constructed two ponds of approximately five acres in size each on the Bodcau Game Management Area for the purpose of farm pond experimental research. The carpenter crew built concrete water control structures in each of these two ponds. There were two water wells drilled under the supervision of the Engineering Section. One is located at the Tendal cabin on the Chicago Mills Game Management Area and the other at the cabin on the Caldwell Game Management Area.

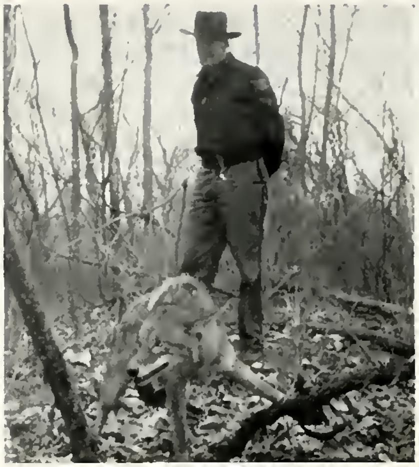
The Fish and Game Division has one three-quarter cubic yard dragline mounted on a spud barge and is assigned to the Biloxi Public Hunting and Fish Area to build earthen dams and water control structures and for various other reclamation work in the marsh areas in order to improve the wildlife and migratory waterfowl habitat. They also have one three-quarter cubic yard dragline which is assigned primarily for building roads, fills, cuts, and bridges on game management areas. It is also used in building levees and water control structures for impoundments.

The Fish and Game Division Drafting Office is comprised of one full time employee and a part-time student aide who works approximately twenty hours each week. This office is responsible for much of the general map work that is required by the Department as well as the Fish and Game Division. Plans for construction of buildings by this division are produced in detail. Various types of graphs, maps, sketches, contact drawings, tables and forms are required from time to time for reports, papers, publications, and magazines.

During this biennium detailed plans were drawn for several authorized buildings to be constructed throughout the state. These included plans for headquarters buildings on Thistlethwaite and Russell Sage Wildlife Management Areas, plans for expansion of the District III office building to double its original size and plans to expand the supervisor's building on Red Dirt Wildlife Management Area.

Numerous maps were made of the Atchafalaya Floodway system and portions of the same for visual aids in talks, meetings and discussions. Other maps of the system were made to be used in reports and publications concerning the production of fish and wildlife in the Atchafalaya Floodway Basin.

The wildlife management area maps of Russell Sage, Union, West Bay, East Carroll, Bodcau, Jackson-Bienville, Chicago Mills, Evangeline and Catahoula were revised and brought up to date with respect to roads, pipelines, boundary changes, road names, construction changes or area hunting restrictions. Some other maps were redrawn completely. These included areas that were expanded or changed to such a degree that revision of the original map were impractical. Fort Polk and Sabine Areas are in this group. Maps of Lutcher Moore Wildlife Management Area, a recently acquired area, and Biloxi and Grassy Lake Wildlife Management Areas were also made. Maps now being made include Wisner and Soda Lake Wildlife Management Areas. These maps are compiled by using information from the latest available topographic quadrangle maps along with personal knowledge from observation by field personnel, aerial photographs, records and other reliable sources. These maps are then made available to the public hunter during the controlled hunts on each area.



T. E. HARRIS
Predator Control Supervisor

A map depicting proposed improvements wa made up for the Waddill State Wildlife Are which is located in East Baton Rouge Parish

The annual deer season map, turkey and bea season map and wildlife management area loca tion maps were produced for publication in th LOUISIANA CONSERVATIONIST and in bro chure form each year with the outline of huntin seasons and hunting and fishing laws.

The topographic quadrangle map file in thi office has been expanded to maintain an inde file and a limited stock of each map to be draw on by field personnel.

Various other projects were completed durin the last two years. Among some of the most im portant are the following: A group of graph was made as posters to be used in visual ai for a senate committee meeting in Washingto concerning the waterfowl hunting seasons in thi state. A new "Deer Kill Data Form" was pre pared prior to the 1963-64 deer season on th wildlife management areas. This form was use to collect information from deer killed on eac management area. A continuous deer releas program has required the production of numbered tabs depicting the year of the release an the number of deer in each release. These tab are adhesive backed and are placed on maps i each district office to mark the point of eac release. A district map was devised for each o the Fish and Game Division districts. From thi map of each district another map was subdivide into smaller areas and is to be used as a dee range survey map. Squirrel movement graphs t be used in a report were made from informatio acquired on Thistlethwaite Wildlife Managemen area.

Numerous maps were made concerning population and range of Fulvous Tree Duck for a scientific paper. Diagrams and illustrations were drawn for a publication to be produced for use by private individuals in construction of farm ponds.

Predator Control Section

The Predator Control Section is composed of seven trappers and one supervisor, plus one full time trapper employed by the Police Jury of Caddo Parish.

The wolf continues to be the most troublesome wild predator and geese which are used by farmers to control grass in cotton fields continue to be one of the favorite foods for wolves. No accurate assessment can be made of all the foods utilized by wolves, bobcats, foxes and wild dogs except by examination of droppings and stomachs which is being conducted by a research group at Louisiana State University at this time.

The animal or predator that is the most detrimental to wildlife, especially deer, is the free ranging dog. These domestic animals destroy many deer during the time before and after fawns are born.

It has not definitely been established what breed of wolves are occurring in Louisiana. Stanley P. Young and E. A. Goldman in their book, "Wolves of North America" published in 1944 describes a wolf identified as *Canis niger rufus*, a sub-specie of the Texas Red Wolf that was prevalent in east Texas, southeast Oklahoma and western Arkansas that fits the description of our wolves, however, one skull has been identified as coyote.

The following is a list of parishes where wolves were trapped in 1962 and 1963.

Parish	*1962*	*1963*
Avoyelles	2	6
Bienville	3	......
Bossier	11	14
Caddo	34	29
Claiborne	13	3
DeSoto	43	19
East Carroll	......	1
Grant	3	3
LaSalle	1	3
Lincoln	1	......
Madison	......	3
Morehouse	2	......
Natchitoches	16	17
Rapides	17	24
Red River	19	18
Sabine	5	2
Union	......	1
Vernon	......	5
Webster	4	5
West Carroll	......	2
Winn	......	1
TOTAL	174	*162

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*Through November 15, 1963.

Bobcats are very numerous in the northeastern parishes where we have no trappers at all. One of our problems continues to be, the fact that our men live so far from where our work is needed.

During this biennium the Predator Control Section answered calls to rabies infested areas. Predator personnel conducted classes with interested local citizens in the area demonstrating to them how to trap. The citizens of the community then assisted in solving their problems. This extension type service for predator control has been conducted on other projects with success.

The predator control section has assisted in several research projects of national significance. Various Universities, Governmental Agencies and Medical schools have requested certain species of animals for special projects. The animals have been trapped and shipped to the research parties.

During this period six bear have been trapped and transplanted to other areas. The bear shows promise of being another popular big game animal in our State.

The following is a list of all animals taken in 1962.

Wolves	174
Bobcats	119
Foxes	681
Housecats	186
Skunks	488
Miscellaneous animals*	916

The following is a list of all animals taken in 1963.

Wolves	162
Bobcats	62
Foxes	370
Housecats	48
Skunks	167
Miscellaneous animals*	169

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*Wild dogs, Opossums, Raccoons.

Hyacinth Control Section

FRED MYERS
Coordinator
JOHN "PETE" DUTTON
Field Supervisor
VIRGIL T. LAPHAM
Biologist

The Aquatic Vegetation Control Program as it exists today has developed as an extension of the Water Hyacinth Control Program. Since 1959 this program has been a combined effort of the State of Louisiana and the U. S. Corps of Engineers. Of the State administered portion of the program, Louisiana furnishes 60 percent and the Corps of Engineers 40 percent. The State's work has been mainly in the lakes and streams of the upper part of the state, while the Corps of Engineers work has been on the navigable water ways in the southern part of the state. This fiscal year will complete the first five year phase of the combined program. The Corps of Engineers has a bill in the U. S. Congress to continue this weed program for another five years.

The State, during the last five years, has cleaned most of the hyacinths and other emergent weeds from the many streams and lakes in the northern part of the State to an occasional maintenance status. Including follow up work, we have treated approximately 40,000 acres during the past two years.

The severe drought of the past two years has exposed many acres of mud banks on most of our lakes permitting the germination of millions of hyacinth seeds which have been lying dormant for years. Thus necessitating a redoubling of our efforts on lakes which have been in a maintenance phase for the past several years. This plus the release of many underwater plants which were suppressed by the dense mats of hyacinth necessitates the continued efforts of our research section to find means of efficient and effective control of these underwater plants.

The late Dr. Nelson Gowanloch, Chief Biologist with the Louisiana Department of Wild Life and Fisheries, conducted extensive research during the 1940's which served as a basis for starting the present control program. From his research, he concluded: 1) the seeds of the hyacinth are of such durable construction that it has been able to resist all practicable methods contrived by man to destroy it, 2) the seed will lie dormant in the muddy bottom of a body of water for as long as twenty years and then germinate when the right conditions of temperature and sunlight occur, 3) one plant, if afforded ample space, will reproduce to 65,000 additional plants in a normal spring-summer growing season in mid-Louisiana, and in the extreme southern part of the State where the growing season is much longer, it is reasonable to assume that this number could well be doubled, 4) the plant, (not the seed), can be killed by spraying it with a one-half of one-percent solution of 2,4-Dichlorophenoxyacetic Acid, (Amine Salt Formulation), commonly known as 2,4-D.

Using the findings of Dr. Gowanloch as a spring-board, first steps were taken by the old Wild Life and Fisheries Department which led to the program presently being used with marked success throughout Louisiana. The first program, inaugurated in 1946, was very crude and costly. Steel barbes, sixteen to eighteen feet in length and four feet wide, built of ten-gauge steel, supported high-pressure car-washing spray-pumps which were powered by a six-horsepower air-cooled engine were constructed. This equipment weighed from 1,800 to 2,000 pounds and required six men to load and unload it from a truck when moving from one body of water to another. The high pressure produced by this equipment caused a light fog in the spray stream which could be carried by a gentle breeze to growing farm crops, such as cotton and vegetables, and cause heavy damage. The additional weight of about 500 lbs. of spray solution and at least 300 lbs. for two operators, made this a cumbersome and awkward piece of equipment. It did a fairly thorough job, but was extremely slow. Further, there was the ever-present danger of killing farm crops, which could not be allowed to continue because of the necessity for making recompense to the crop-owners for these damages.

With the institution of the present Commission form of Wild Life Administration in Louisiana on December 16, 1952, a new look was taken at this program. A sharp eye was aimed at increasing its efficiency so as to reach all the hyacinth infested waters of the State, and removing

Bear trapping and transplanting has been conducted by the Commission Predator Control Section. Bears have been removed from areas of moderate populations and placed in more remote areas in hopes of building up the population. The bear is a popular big game animal in many states and can become one in Louisiana with proper management and protection.

Hyacinth Control crew spraying in Northeast Louisiana. The Commission's Hyacinth Control section has effectively controlled water hyacinth and kept Louisiana waterways open.

all possibility of damage to growing farm crops. Desired results were obtained by re-designing the entire boat-spray-unit, substituting a lightweight rotary hydro-tractor pump and an equally light 2½ h.p. air-cooled gasoline engine. The entire unit weighs only about seventy-five pounds and can be moved by one man. This was mounted on an open type boat, constructed of 14 gauge steel, with a 100 gallon compartment built in mid-ship to contain the spray solution. This boat had a wedge shaped bow and was propelled by a 5½ and/or a 10 h.p. outboard motor, depending on the tightness of the mat in which we were working. This type of boat has been abandoned because we have cleared out all known hyacinth mats in the State where it was required. We now use this same type of spray unit, mounted on a wood frame, which is saddled over the middle seat of a V-bottom aluminum boat. This unit produces a nozzle pressure not exceeding 60 p.s.i. and does not cause fogging of the sprayed mixture, thus eliminating the danger of killing cotton and other farm crops. There is sufficient pressure to throw a stream a distance of fifty feet, with the outer ten-feet fanning out for excellent coverage. The spray solution is mixed in a fifty-five gallon drum, carried in the boat. A crew of two men on each boat can treat fifteen to twenty acres in a normal work day.

A considerable increase in killing power of the spray solution has been obtained by the addition of about three ounces of a non-sudzing detergent to each fifty gallons of water, to which has been added one-quart of 2,4-D. This reduces the surface tension of the mixture and thusly prevents the formation of droplets which would readily roll off the waxy surface of the hyacinth plant. Another surfactant known as "spreader-sticker" is added to the mixture for this purpose when treating the white water lily or lotus and other undesirable aquatic weeds which we have added to our list.

A heavier type of spray unit has been fabricated in this Section which pulls water from the stream, mixes it with 2,4-D and sprays it simultaneously. Being somewhat heavier, a larger aluminum boat is required to transport this unit. However, it has been found to be of great value by eliminating the need for a mixing compartment, and, it will throw the stream much farther. It is used very advantageously in large swamp areas such as the Atchafalaya Spillway and the Spring Bayou system of lakes and streams in Avoyelles Parish, where fog drifting from its spray-stream cannot reach growing farm crops.

Contrary to popular belief, this program is not seasonal, but is in full operation throughout the year. In fact, a quicker and more thorough killing effect is obtained during the colder months from October to March. During these months, frost has wilted, not killed, the upper leaves of the plant thus exposing its rhyzome, (heart) to a more direct action by the 2,4-D.

It is not claimed that this program has, or will completely eliminate the water hyacinth from the waters of our State, but it definitely has brought about complete control. Our efforts for the past four years have been directed at maintaining this high degree of control. Because of the germination of dormant seeds each Spring which have been lying in wait for suitable conditions of temperature and sunlight, we feel that this maintenance work will continue. In order to prevent a greater accumulation of such seeds, we triple our efforts in the spring in an attempt to spray and kill as many plants as possible before they bloom and produce more seed.

The business of supplying those things necessary for carrying on sport and commercial activities on the waterways of this country has developed into one of great magnitude. Figures published by the Outboard Boating Club of America indicate that in each of our fifty states, an average of $50,000,000 was spent on purchases of this kind in 1959, by those engaged in sports and commercial use of our waterways. Since Louisiana is more abundantly blessed with waterways than most other States, it is reasonable to assume that we spent even more than the average for these items. However, accepting the average of $50,000,000, the State of Louisiana collected a 2% Sales Tax and most of the Parishes another 1% Sales Tax on these purchases, or, a monetary benefit to the State of from 1 million to 1½ million dollars for 1959. Obviously, these purchases would not have been made had our waterways remained covered with water hyacinths as they were when we began our reorganized control program in the Spring of 1953.

There are a total of 60 people employed directly in the Hyacinth Control Section, comprising of a coordinator, supervisor, research biologist, 2 maintenance repairmen, one office clerk, and 54 field workers classified as hyacinth control workers. The field workers consist of 4 hyacinth control workers II and 50 hyacinth control workers I.

Each crew is comprised of two men operating from one boat with a complete set of equipment, a boat, 10 horsepower outboard motor, and a spray-pumping unit. Our crews are situated over the State as follows:

Location	*Complement*
Lake Wallace, Caddo Parish	1 Crew
Lake Bistineau, Webster Parish	2 Crews
Saline Lake, Winn Parish	3 Crews
Spring Bayou, Avoyelles Parish	4 Crews
Crowley, Vermilion Parish	1 Crew
Spanish Lake, Iberia Parish	1 Crew
Martin Lake, Lafayette Parish	1 Crew
Henderson, St. Martin Parish	2 Crews
Pierre Part, Assumption Parish	1 Crew
Bayou Pigeon, Iberville Parish	1 Crew
Rosedale, Iberville Parish	4 Crews
Newellton, Tensas Parish	1 Crew
Bear Island, Livingston Parish	2 Crews
Madisonville, St. Tammany Parish	1 Crew
Slidell, St. Tammany Parish	1 Crew
Miller's Lake, Evangeline Parish	1 Crew

Each crew is assigned a one-half or three-quarter ton pickup truck for their transportation and the transporting of equipment from one body of water to another. Crews are issued courtesy charge cards for purchases of gasoline and o and other minor truck needs in the field.

We have two maintenance repairmen who ar engaged full time in repairing the equipment use by the crews and doing lower echelon maintenance work on their trucks.

We also own a large 2½ ton stake body truc used in distributing the heavy drums of 2,4- (600 pounds each), detergent and other unwieldy materials to the various crews statione over the State. This truck is equipped with a lif gate used in loading and unloading this heav material. This unit has proven to be very efficient as well as a definite factor concernin safety.

The coordinator, the supervisor, and the research biologist each have a stationwagon fo transportation in carrying out their respectiv duties.

For gaining access to uncharted areas we us a Ford tractor pulling a big wheel trailor t transport equipment to and from the work areas This unit has proven most effective in the Marksville area, where there are many small lakes an ponds to which there are no access roads.

The Section also owns a Boston Whaler fiberglass boat and a 40 horsepower motor, used b the supervisor in his inspection and supervisio on the larger bodies of water such as Lake Bistineau, the Black, Clear, and Saline chain, an the Spring Bayou Water System at Marksville

Remember the slogan "Is This Trip Necessary? once widely posted to assist the war effort? Paraphrased to say "research" makes it aptly applicable to any tax supported investigative effort. A careful review of the results obtained over th years by research conducted by personnel of th Louisiana Wild Life and Fisheries in aquati plant control and subsequent use in the field b control crews permits the answer "YES".

The economic importance of aquatic vegetation to the economy of the state was clearly recognized by the late Dr. George Nelson Gowenloch. In 1947 he estimated the costs of damage from water hyacinths to be between sixty-fiv and seventy-five millions of dollars annually. Th rising income and increased leisure time of th people has permitted enjoyment of "Th Sportsmen's Paradise" by an ever expandin number of people. The increased interest in fishing, hunting, boating, water skiing, skin diving swimming, and other forms of outdoor recreation has increased tremendously with each passing year. Few indeed are the families which d not now, or soon plan to own some form of boat motor, or other equipment necessary for participation in these activities. This increase in demand for the use of our waters since that earl date would therefore increase their value fa above the amount estimated by Dr. Gowenloch in the days just after World War II. The presence of impeding aquatic vegetation in the waters of the state would now probably represent a loss far in excess of the average amount which he estimated to be seventy millions of dollars per year.

To a large degree, the ever increasing trend toward making our water areas more attractive to watersport enthusiasts by impoundment and stabilization, has compounded the problem. Over the greater part of the state of Louisiana, still water means clear water. Water plants of almost all forms prefer clear, quiet, water. In the efforts to satisfy the growing demand for clear, clean water, we have created perfect conditions for producing vast amounts of the very thing which would spoil it. In years past, the unimpeded free flowing streams, and the natural lakes and bayous provided more than adequate space for the small number of people then using them. Natural scouring kept the streams clear of objectionable amounts of weeds. Annual inundation, with the resulting deposition of rich silt, covered and suppressed plants in the lakes and bayous. Unfortunately, if many people are to have the opportunity to enjoy recreation on waters close to home, these natural water areas are no longer adequate. Increased acreages of available water are constantly demanded and can only be supplied by artificial means. The injudicious and sometimes unnecessary construction of levees and control structures by the U. S. Corps of Engineers have eliminated much highly productive water and produced other weed problems by denying turbid water to streams once subject to revitalizing inundation, thus causing them to clear and become subject to weed infestation. The spread of aquatic plants is also accelerated by the transfer of these plants from area to area on boats, motors, tackle, and particularly on the frames and running gear of boat trailers. Seven different species of noxious water plants were recently counted on one boat trailer found parked at a heavily used launching ramp.

It is abundantly clear that if we in Louisiana are to continue to capitalize on this very real financial asset and permit its continued use by the sportsmen of our state and attract the tourist, every effort must be made toward finding effective methods for control of these water loving plants which are usurping and pervading these lakes and streams which are so much in demand.

A definite research program is imperative if control of these plants is to be accomplished efficiently, and as cheaply as possible. Many different substances must be tested in a variety of situations in careful, persistent studies, in definite areas where results can be studied with accuracy. Successful treatments on these research plots must be evaluated in different situations, techniques and times of application must be tested over a period of time, before a general control program can be conscientiously recommended to the Legislature for funds to implement the program. This cautious progress has caused disappointment to some people, who want their pet "fishing hole" cleaned up yesterday. We are perhaps old fashioned though, and feel that the taxpayer is entitled to the greatest return for each of his tax dollars expended. If this is to be the case, general control programs should be delayed until the most economical or a reasonably economic control method is determined. Such a procedure and the subsequent control program are costly, yet it is felt that monies so expended have given the State of Louisiana one of the best returns on an investment she has had for a long time. If annual loss is assumed to still be an average of seventy million dollars per year, appropriations for all research, all operating expenses incident to the control program for the entire ten year period would amount to less than one twenty eighth of a single year's losses.

This jungle of hyacinths could be the offspring for one year of one single plant.

The use in Louisiana of the hormone type herbicides, chiefly of the Phenoxy group, was pioneered by Dr. Gowenloch and his associates in the late forties. The emphasis was on hyacinths in those days. Refinements of product, techniques, and equipment since those early days have eliminated the dense stands of water-hyacinths then present, and returned thousands upon thousands of acres of dangerous, sterile water back to the people as safe, open, highly productive recreational areas. The "total eradication" toward which he aimed has been found over the years to be almost impossible. New plants float in from inaccessible areas. Seeds lying dormant on a mudflat germinate. Rapid vegetative reproduction of these "mother plants" within a few months, could easily wipe out the work of years. To prevent this possibility, most of the areas of the state are now in what is called the "Maintenance phase." This consists of constant patrol and treatment and must be continued if our waters are not to return to the weed choked menaces of sad memory.

The removal of the dense mats of hyacinths has permitted the sunlight to penetrate to great depths, stimulating a growth response in the underwater plants called "submergents." Suppressed by the dense hyacinth over-story they presented no problem; released, they are becoming almost as much of a nuisance as the hyacinth. The group is a very large one, made up of many species. Only the most common are included in this report. Coontail (Ceratophyllum demersum), watermilfoils (Myriophyllum spp.), elodea (Elodea densa), fanwort (Cabomba caroliniana), and the pondweeds (Potomogeton spp.) are perhaps the greatest nuisances in that they tangle fishing lures, wind around boat propellers, and prohibit swimming. To these must be added the lesser problems of naiad (Najas spp.), bladderwort (Utricularia spp.), muskgrass (Chara spp.), nitella (Nitella spp.), and mudplantain (Heteranthera dubia). From among the many chemicals tested for effectiveness against these plants, two have given outstanding results. One is a combination of 2-(2, 4, 5-Trichloro phenoxy) propionic acid and 3, 6-endoxohexahydrophthalic acid as potassium salts. The other is the still imported English chemical 1, 1′-dimethyl-4, 4′-dipyridylium. Both of these materials are still largely in the research stage and costs are prohibitively high. Increased demand and resultant expansion of production efforts will undoubtedly reduce the costs, meanwhile efforts toward finding the most economical use rate of these and other new chemicals for our waters will be continued until they become available for general use. In the treatment of underwater plants, the entire water column must be treated. Rates of treatment are given in pounds or gallons "per acre foot" (1 acre of area, 1 foot in depth). Waters of impoundments in the state are estimated to average four feet in depth. Thus where twenty-five dollars per acre might be readily approved, the quadrupled amount would average one hundred dollars per acre which puts it out of reach for general use. If control of submergents is begun as a general practice in the near future, the latter figure should be borne in mind in estimating cost of the total program. We have one other alternative, water fluctuation.

On impoundments equipped with an adequate control structure, it has been found that most submergents can be effectively and economically controlled by rapidly lowering the water during early July, exposing the plants to the action of the air and the hot summer sun. Decomposition of these plants in open air prevents oxygen depletion of the water, and liberation of bound nutrients, when area is reflooded, vastly enhances growth of fish.

The phenoxy group of hormonal herbicides chiefly the amine salt of 2,4-Dichlorophenoxyacetic acid, have been the key which unlocked the door to control of the waterhyacinth and, combined with varying amounts of the new surface active agents called "surfactants", give excellent, and economical, control of most of the plants which extend at least part of their surface above the top of the water. These plants are called "emergents". Surfactants lower surface tension of the spray solution and prevent formation of droplets which cause runoff. They also enable formation of a thin film of the chemica to form over the exposed surface of the plant vastly increasing the area directly in contac with the herbicide. The waxy coating on the plant's surface is also dissolved. Wash-off by rai or wave action is inhibited. Generally speaking the emergent group will include American lotus (Nelumbo lutea), waterlilies (Nelumbo sp.) watershield (brasenia schreberi), spatterdock (Nuphar advena), water primrose (Jussiaea sp.), frogbit (Limnobium spongia), and the arrowhead family (Sagittaria spp.). Waterlettuce (Pistia stratioites) does not respond well to this treatment. The duckweed and watermea groups (Lemna minor, L. perpusilla, Wolffia columbiana, W. papulifera, and Wolffiella floridana are also largely unaffected.

Alligator weed (Alternanthera philoxeroides) although an emergent, is amphibious and can grow on either water or dry land. During the past biennium efforts of the Research section have been largely directed toward finding an economically feasible chemical control for this plant. Over six hundred and fifty separate tests have been made, using forty-three different chemicals alone and in various combinations. Encouraging results have been obtained, and kills effected. Cost of materials at present prices precludes their general use within the framework of our current appropriation. Most chemicals were found to kill the plant only to the water line which produces a "lawnmower" effect on the plants. Dr. Frederich W. zurBurg, of Southwestern University, working on a grant from the U. S. Corps of Engineers, has recently announced that his group has discovered an economical treatment. We had sufficient material to run only one test of their combination. Results were very interesting. It is planned that additional tests will be made next year if an adequate quantity of chemical can be obtained. Too often it is found that the material which looked so good last season, refuses to work the next time around in a new location.

Chemical companies, although still oriented toward the more profitable agricultural field are now well aware of the potentials in aquatic vegetation control. They are now doing a considerable amount of work in this field, and have also contracted out other research work to various educational institutions. They also encourage research efforts such as ours. Any reasonable request for test chemicals is quickly granted, and requests for assistance, as far as possible. This effects a tremendous saving to the state, as research chemicals, which are understandably expensive, are furnished free of cost for our research. Purchase of these on the open market would run into many thousands of dollars. A number of these have been formulated specially upon our request. Two years ago we worked out a homemade floating granule which was found to be very effective against alligatorweed. The company was requested to furnish a supply if possible. Their research showed our formulation to be too unstable for interstate shipment, but they continued their efforts to approximate the material. This year a pilot sample of the resulting material was furnished and appears to be one of the most effective herbicides on waterlettuce and the duckweeds which we have found to date. The latter tiny plant covers the entire water surface and multiplies with bacterial rapidity. Many pond owners find it highly objectionable and an economical means of control has been sought for some time. It is hoped this material can be put on the market soon.

Keeping in mind the capital outlay already invested in the hyacinth control program, all tests have been tied in with the already existing practices of the group. All tests have been put in by regular hyacinth control crews, using standard field equipment, and standard operating procedure. Thus results obtained should be readily adaptable to large scale field use without retaining personnel or making a further extensive outlay for new types of equipment, however, new equipment is tested, in an attempt to find more efficient methods of application.

Alligatorweed (Alternanthera philoxeroides) is fast becoming our number one pest plant. Difficult to kill, its nodes rapidly grow a new plant. Dense mats smother out all aquatic life and become thick enough to support the weight of a man.

Parrotfeather (Myriophyllum brasiliense). Do not transfer because of its beautiful green feathery appearance. It can rapidly prevent fishing and boating.

New chemicals are tested for fish toxicity at our laboratory at Monroe, as it is found that published data may not always apply to our local conditions. This local evaluation eliminates the possibility of an embarrassing fish kill with its resulting adverse publicity. Materials are also carefully screened for danger to waterusers, spray crews, livestock, fish, game, or agricultural crops immediately adjacent to spray areas. That these efforts have paid off is best shown by the fact that never in the entire ten year period has a just claim for damages been presented for payment.

Much progress has been made, but it should be made clear to every reader that the complete answers to all our problems have not yet, and may never, be found. Costs of the continued program, however, are felt to be well worth while. Hyacinth control is now in the maintenance phase. A review of current literature, coupled with information obtained from technicians from as far away as Australia, India, and Africa reveals that the control program now in effect on the waters of Louisiana by personnel of the Louisiana Wild Life and Fisheries Commission, is probably the most economical, efficient, and effective program extant today in the world wide efforts against the "purple menace". The total cost of the actual control program for the entire ten year period the present program has been in effect, plus all research expenses, is found to be only a small fraction of the estimated losses for one single year.

Game Section

CHARLES R. SHAW
Supervisor Game Section & P-R Coordinator

Included in the activities of the Game Section (which is primarily composed of and almost synonymous with the Pittman-Robertson Section) are research, development and management concerned with all resident and migratory species of game. There has even been some work on exotic species of birds such as Black Francolins and Jungle Fowl, which we hope may some day be numerous enough to be included under our resident species.

The acquisition of game management and/or public shooting areas to increase and retain the recreational opportunity for the present and also the future sportsmen of the state is one of the primary objectives of the Fish and Game Division and this work is implemented through the Game Section. A list of these areas is included and the specific information on the various areas listed in the table is included in the reports by the eight District Supervisors. The men holding these positions are all qualified wildlife biologists. Due to the accelerated posting of private lands the acquisition and retention of areas for public use assumes more importance each year.

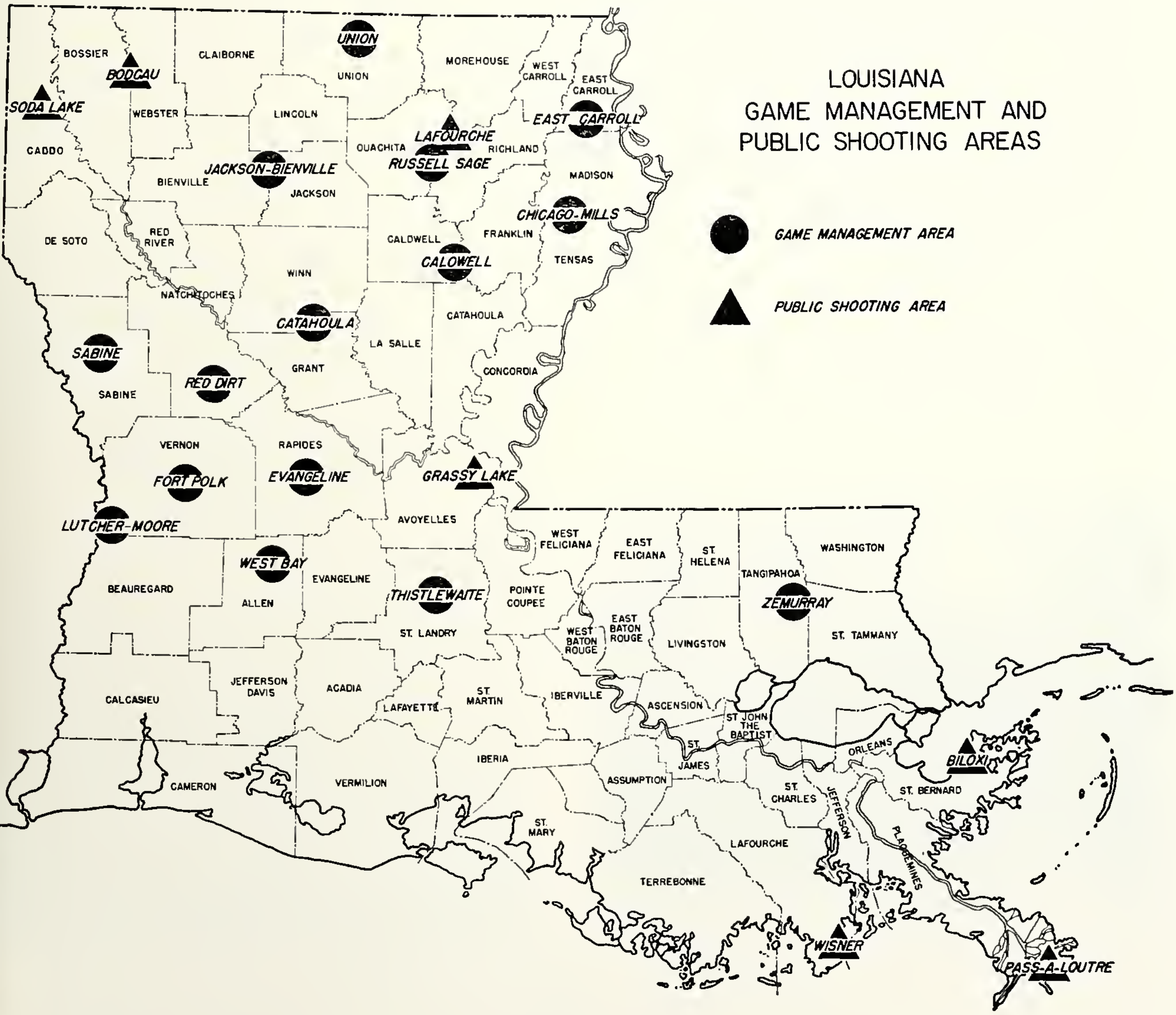
Research activities are carried out primarily under P-R Project 29-R with Robert Murry serving as Project Leader and the specific studies on the various species being reported on by the study leader (wildlife biologist) to whom the particular research work is assigned. A special statistical project under Herbert Stern also assists with various studies on game and fish This project will be reported on separately.

The eight districts into which the state is divided for administrative purposes serve as natural subdivisions for developmental work and the District Supervisors (wildlife biologists) will report on the management and developmental activities within their respective districts. This will include the game management and/or public shooting areas, managed hunts, etc.

A herd of wild deer on a Louisiana marsh refuge is spotted from the air. Restocking programs by the Wild Life and Fisheries Commission have utilized air transportation in moving deer from area to area in a short period of time.

LOCATION AND SIZE OF AREAS OPERATED BY THE FISH & GAME DIVISION FOR THE BENEFIT OF THE SPORTSMEN OF LOUISIANA

Name of Area	*Acreage*	*Parish(es)*
Alexandria Wildlife Management Area	7,875	Rapides
Bayou Bodcau Game Management Area	32,471	Bossier & Webster
Biloxi Marshlands Waterfowl Development Area	39,728	St. Bernard
Bonnet Carre Game Management Area	3,324	St. Charles
Caldwell Game Management Area	12,123	Caldwell
Catahoula Game Management Area	40,000	Winn & Grant
Catahoula Lake Waterfowl Refuge	Approx. 1,000	Catahoula
Chicago Mill Game Management Area	105,000	Madison, Franklin and Tensas
DeRidder Airport Public Hunting Area	800	Beauregard
East Carroll Game Management Area	9,640	East Carroll
Evangeline Game Management Area	15,000	Rapides
Finch Bayou Public Hunting and Fishing Area	600	Union
Fisher Creek Public Hunting and Fishing Area	500	East Carroll
Fort Polk Game Management Area	52,000	Vernon
Grassey Lake Game Management Area	25,000	Avoyelles
Jackson-Bienville Game Management Area	22,000	Jackson and Bienville
LaFourche Public Shooting Area	1,875	Richland
Idlewild Plantation Game Research Refuge	1,731	E. Feliciana
Lutcher-Moore Game Management Area	55,000	Vernon
Red Dirt Game Management Area	38,000	Natchitoches
Russell-Sage Game Management Area	15,640	Ouachita, Richland and Morehouse
Sabine Game Management Area	12,000	Sabine
Shiloh Creek Public Shooting Area	1,200	Morehouse
Soda Lake Wildlife Management Area	600	Caddo
Thistlethwaite Game Management Area	11,100	St. Landry
Terzia Wildlife Refuge	46,000	Morehouse
Union Game Management Area	10,000	Union
Waddill Wildlife Refuge	224	E. Baton Rouge
West Bay Game Management Area	58,000	Allen
Wisner Public Shooting Grounds	30,000	Lafourche
Zemurray Game Management Area	5,294	Tangipahoa



GAME DEVELOPMENT

KENNETH C. SMITH

One of the primary responsibilities of the Pittman-Robertson development program is and has been the acquisition of game management rights on large acreages of land which has been closed to the public or which may be closed in the future. This job becomes more difficult with each passing year since hunting opportunity has diminished to the point in many sections of the state that land with good game populations commands a high premium.

During the biennium 1960-61, the upland acreage in game management areas increased from 245,000 to 550,000. Unfortunately, we cannot report a similar increase for the 1962-63 period. Several possible areas have come to the attention of the Commission but to date only one has any real prospect of materializing. This is the Concordia Parish area just west of Ferriday, of approximately 12,000 acres. At this writing the Governor's Proclamation has been signed and is being duly advertised in the appropriate local papers. It will officially be added to the list of Game Management Areas which have been open to public hunting and received so well by our Louisiana hunters.

If more people are turning to the outdoors for recreation, and if the available hunting acreage per person is diminishing; then what can be done? We can't manufacture more land but it most assuredly is possible to make each available acre produce more. This is being demonstrated more emphatically each year as the game management areas are being operated more efficiently.

Since interest in deer hunting has grown tremendously in the past 10 years, lets take a look at this species and see what's new. It is probably best to refer the reader to the kil figures given in the reports of the respective game management areas than to attempt to duplicate these data here. What is really important is that a more realistic harvest of game animals has taken place due to an either sex season on all the game management areas where a high deer population exists. This is not an entirely new approach but what is new is tha for the 1963-64 season a relatively high number (of animals to be removed) was set before the season and either-sex deer taken until tha number was reached, then the remaining days in any of the five day hunt devoted to buck hunting only. Justification for this latter aspect is the idea that all interested hunters cannot be notified during the short time available between the end of one days hunt and the beginning of the next. If they cannot get at least 24 hours prior notification that the number has been reached and that the hunt is ended, then provisions must be made whereby the individual wishing to hunt the next day can be allowed to do so By reverting to bucks only the day after the above mentioned number has been reached, the sportsmen gets to make his hunt and the total harvest will not be greatly affected. This is not meant to imply that the majority of the deer have been removed by hunters. Most of those persons wishing to hunt either sex deer will have heard the bucks only rule is in affect and will not wish to go the following day.

Supervisory personnel of the Fish and Game Division on a field trip in District I. Personnel visited wildlife projects throughout the District.

Two outstanding features of these managed areas have come to light during the past eight to ten years. One of these is the intense interest generated by the existence of a high deer population plus the lack of restrictions involved in the hunts. All a person needs is the license, which is relatively inexpensive, and a legal firearm. The requirement to check in through a permit station serves a very good purpose in that it tells us how many hunter efforts were made and more important it tells us how many deer were taken. If a harvest number is set then the best way to know when that number has been reached is to count them as they are transported from the area.

Another reason for the requirement that each animal be checked by a given point is it enables the biologists to obtain data on weight, age, antler formation as well as information on presence or absence of harmful parasites and extent of infestation. Louisiana participates in a cooperative deer disease study that is coordinated by personnel in the school of veterinary science at Georgia University. Most of the southeastern states have joined this study. Information on this phase of deer management can be obtained by referring to the game research (29-R) portion of this report.

DISTRICT I

JOHN L. HAYGOOD
Supervisor
JAMES H. TAYLOR
Biologist

District I is located in the northwest corner of the state and is made up of the following parishes: Caddo, Bossier, Webster, Claiborne, Bienville, Red River and DeSoto. The District headquarters is located at Minden. There the commission has a four acre lot with an eight room office building, two garages, a work shop, overnight bunk house and a 300 foot radio tower. This headquarters serves as a center for all wildlife and fisheries work in District One. Offices are maintained for the Game Section, Fisheries Section, Enforcement Division, Water Pollution Control Division, and the Education Section.

The game biologists in this district carry out a large variety of duties. Through a cooperative agreement this district provides technical assistance to Barksdale Air Force Base and the Louisiana Ordnance Plant. This technical assistance provides these military bases with professional guidance in all wildlife management and problems. Local parish Police Juries are provided technical assistance on wildlife problems upon request. Game biologists make deer range and population surveys, thus keeping tabs on the deer herd development and management in the various parishes. Various wildlife research jobs are assigned to the district personnel by the study leaders such as, woodduck trapping and banding, dove population counts and deer disease checks.

There are three game management areas in the District One, Jackson-Bienville, Bodcau and Soda Lake. The latter is primarily a waterfowl area.

SODA LAKE WATERFOWL MANAGEMENT AREA

KINSEY MARTIN
Acting Area Supervisor

This area is in Caddo Parish some 15 miles north of Shreveport. Soda Lake is an old drained lake bed. Before the days of modern drainage this old lake flooded annually much like Catahoula Lake, only on a smaller scale. The digging out and making a canal of Twelve Mile Bayou completely drained the lake. The commission leased 1,240 acres of the old lake bed from the Caddo Levee Board, then constructed levees and dams to retain water over about 600 acres during the duck season. The Caddo Parish Police Jury through their conservation committee bought a 14 inch pump, motor and barge to flood this area. With the use of this pump water can be pumped from Twelve Mile Bayou and the impoundments flooded independent of rainfall. The pump was set up and the impoundments flooded for the fall and winter of 1962-63. Hunting was not permitted during the 1962-63 season in order to allow waterfowl to become accustomed to the area. Duck hunting was permitted during the 1963-64 season on Monday, Wednesday and Saturday mornings only.

JOHN L. HAYGOOD
Supervisor, District 1

JACKSON—BIENVILLE GAME MANAGEMENT AREA

FLOYD SIZEMORE
Area Supervisor

The Jackson-Bienville Game Management Area is located in the eastern part of Bienville Parish and the northwestern part of Jackson Parish, about 12 miles south of Ruston and 12 miles north of Jonesboro. This area is on private land, the hunting rights are leased to the Wild Life and Fisheries Commission for public hunting. The lease is for 10 years at no cost to the Commission. The landowners are Davis Brothers Lumber Company, Continental Can Company, Sturgis, Nix Lumber Company, Sizemore Est., Barnard et. als, Louis E. Smith, E. B. McConathy, A. R. Garrett.

Public hunting is allowed by permit. The squirrel and quail hunting is by season permit, with the deer hunting by daily permit. During the 1962-63 season there was a five day managed deer hunt. The first day either sex deer were legal and the remaining four days antler bucks only were legal. The following chart reflects hunter use, kill data and deer weights for the 1962-63 hunting season.

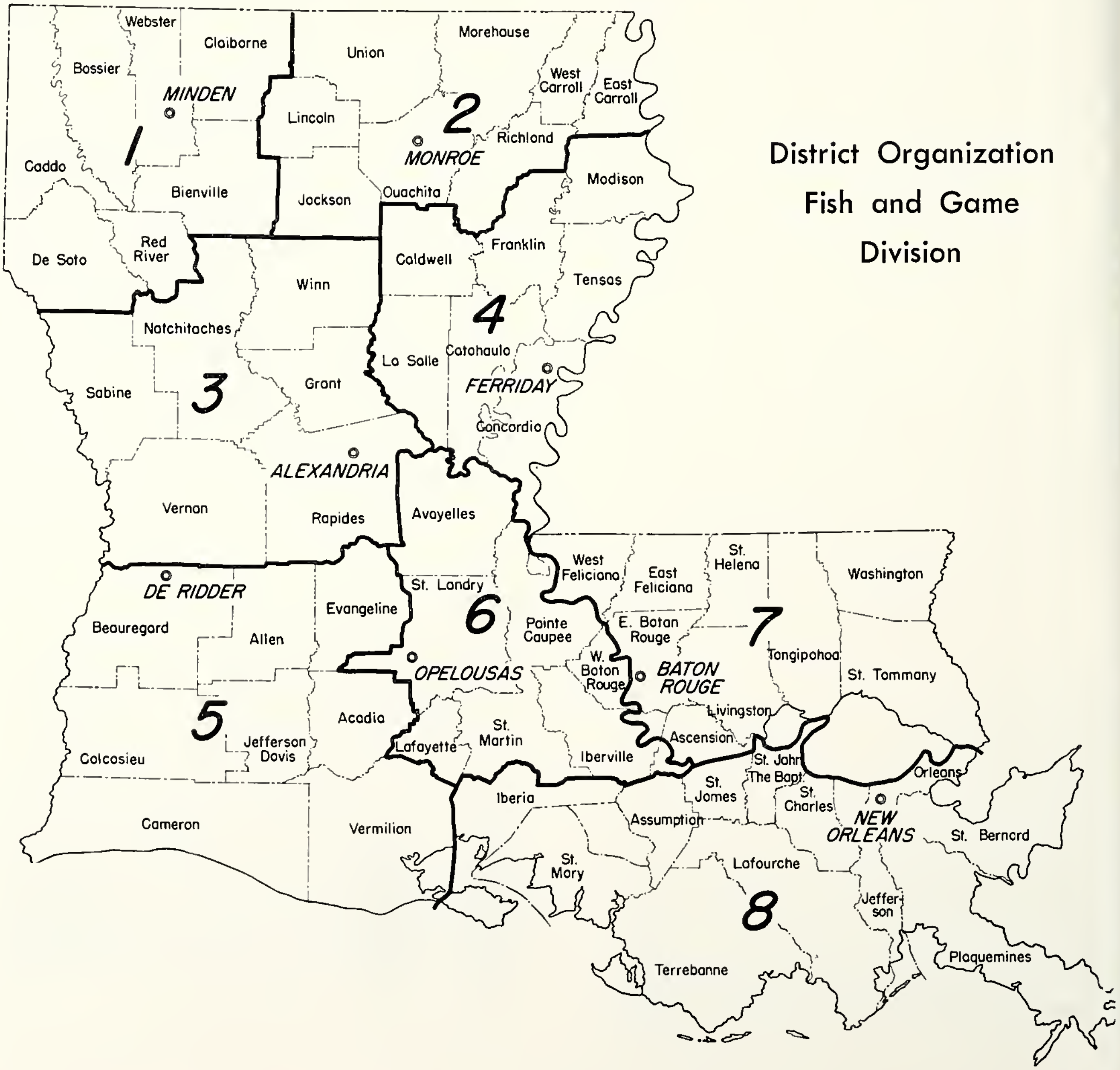
Deer Hunt

November 23-28, 1962

Date	*Hunters*	*Deer Killed*
11-23-62	1,135	138
11-24-62	441	9
11-25-62	160	1
11-26-62	170	3
11-27-62	97	0
11-28-62	139	1
TOTALS	2,142	152

John L. Haygood, Supervisor District I aging deer killed on the Jackson Bienville Game Management Area for physical features and condition of the herd.

Hunters in line at check station receiving daily permits to hunt deer on the Jackson-Bienville Gam Management Area.



District Organization Fish and Game Division

Age, Sex, Weights

	Male		Female	
Age	No.	Average Live Weight	No.	Average Live Weight
Mos.	16	44.9	29	42.26
½ Yrs.	27	97.05	22	84.61
½ Yrs.	4	124.60	11	92.23
½ Yrs.	9	166.63	14	95.27
½ Yrs.	2	192.20	11	99.26
½ Yrs.	1	141.0	5	96.48
TOTALS	59		92	

The 1963-64 deer season on Jackson-Bienville was set for five days with a limit of 400 deer of either sex. If the 400 deer limit was reached before the five days was up then antlerless bucks only would be legal. The following chart reflects the results of this hunt.

Deer Hunt

Date	Hunters	Deer Killed
1-29-63	1,419	181
1-30-63	1,211	78
2- 1-63	599	41
2- 2-63	320	14
2- 3-63	334	11
TOTALS	4,883	325

Age, Sex, Weights

	Male		Female	
Age	No.	Average Live Weight	No.	Average Live Weight
Mos.	35	49.3	57	48.4
1½ Yrs.	65	108.4	41	87.5
2½ Yrs.	22	136.9	34	101.3
3½ Yrs.	9	178.2	31	108.4
4½ Yrs.	8	201.3	15	112.8
5½ Yrs.	0	....	8	109.3
TOTALS	139		186	

The work on this area is toward providing hunting opportunity for the public. There are 15 miles or roads to keep up and six major bridges. The modern hunter in his modern car will not get far from a good road. Good access is very important in order to get an even distribution of the kill. Twenty-five miles of mowed or disced trails are maintained for hunter use.

BODCAU GAME MANAGEMENT AREA

KINSEY MARTIN

Area Supervisor

The Bodcau Game Management Area is located on the U.S. Army Corps of Engineer's Bodcau Flood Control Project. Through cooperative agreement the Corps of Engineers granted the Louisiana Wild Life and Fisheries Commission a license to develop and manage the wildlife on this area. The boundaries include all government owned land lying along Bayou Bodcau from the Arkansas State line to Bellevue in Bossier and Webster Parishes, an area covering approximately 32,000 acres.

The purpose of this management area is to provide maximum public outdoor recreation in the form of hunting, fishing and camping. This can be accomplished only through the development and maintenance of good wildlife habitat, hunter access roads, camp grounds and picnic areas. But, recreational development must not destroy the wilderness aspect of the area. An outdoor recreation area must not be turned into a man made zoo and garden if it is to hold the esteem of the sportsmen.

Wild turkey being released on Bodcau Game Management Area.

The terrain of the Bodcau area is ideally suited for wildlife development. There are many soil and timber types within its boundaries. There are old fields grown up in weeds and grasses, thickets of all kinds of brush, dense stands of hardwood timber, overflow swamp lands, well drained hills and hollows; these varying land types are needed for production of wildlife for the gunner.

The flexible working agreement the commission enjoys on this area allows management of the timber for wildlife production. Without control of the timber stands the commission could do little to increase wildlife production. The openings found throughout this area are maintained as open areas by mowing, discing and burning. These openings provide a niche in the forest habitat, openings are indispensable for maximum wildlife production. Many people see a weed field, briar patch or forest opening and think of this as wasted space, producing nothing. This is far from the truth, for some game species (deer, quail, turkey), openings are the most productive area in the entire forest.

Commission personnel with the assistance and cooperation of Corps of Engineer's personnel are thinning the dense stands of pine timber to permit room for the growth and production of wildlife food plants. Hardwood trees most productive in game food are being protected against destruction.

Twelve wild turkey, trapped in another part of the state, were released on this area March 1963. These turkey, it is hoped, will multiply and populate the forest. Every effort is being made to provide these turkey with the habitat and protection they will need.

Over grazing of free ranging livestock is the biggest problem game managers have to cope with at the present time. These animals are competing with the game animals for food and are destroying wildlife cover by overgrazing. Steps are being taken to alleviate this problem. A cattle and hog proof fence enclosing approximately 1,000 acres was completed during September of 1963. All livestock has been excluded from this overgrazed range. Habitat improvement has been started to reclaim this area.

Two green tree reservoirs totaling 1,500 acres are flooded every fall to provide duck shooting on the pin oak flats. In addition to this approximately 2,000 acres of cypress swamp is flooded by natural overflow of Bayou Bodcau.

The access roads have been improved until at the present time they are adequate without distracting from the natural wild state.

Control burning of the forest and fields is being carried out to improve wildlife habitat. Deer food production is increased by burning tall brush areas, causing this brush to sprout at the ground level where deer can easily reach the tender shoots. Thorny haw thickets are control burned to open up these thickets and allow room for more desirable plants to grow.

Hunting on Bodcau is by season permit, seasons run concurrent with the surrounding parishes. With this one season permit hunters can hunt from dove season in September through quail season in February. During the 1963-64 hunting season 4,784 permits were issued.

Still Hunting, popular way to deer hunt and is becoming more popular with the increasing number of archers. Ben Pearson one of America's top archers chose to hunt on the Commission Game Management Area using a temporary tree stand.

DISTRICT II

CLIFFORD T. WILLIAMS
District Supervisor
JERRY W. FARRAR
Biologist
CHARLES R. BAUR
Biological Aide
GUY CAMPBELL
Biological Aide

Located in the north and northeast portion of the state, District II includes the parishes of Jackson, Lincoln, Union, Ouachita, Richland Morehouse, West Carroll, and East Carroll. Habitat conditions in this district are varied and range from bottomland hardwoods in the Delta to mixed pine-hardwoods in the hill country. The deer herds are on the increase and the Sportsmen of the state have enjoyed longer hunting seasons during the past two years.

Most of the work in District II has dealt chiefly with development, maintenance and management projects on existing game management areas, public hunting and fishing areas, and the exotic game bird release area. A brief report of activities on these areas during the 1962-63 biennium follows:

EAST CARROLL GAME MANAGEMENT AREA

RUSSELL CAMPBELL
Area Supervisor

The East Carroll Game Management Area was leased by the Louisiana Wild Life and Fisheries Commission from the Chicago-Mills and Lumber Company in 1960. Its size is only 9640 acres but consists of good bottomland hardwood type habitat. The deer population on the area is very high and squirrel hunting is moderate.

The main problem occurring on the area is hunter access during inclement weather. In the past, this has affected hunter participation and hunter kill considerably.

Work on the area has dealt mainly with the development of access trails, habitat improvement for wild turkey, and maintenance projects. A wild turkey release is planned for the area in 1964.

Managed Hunts

Controlled hunts have been held yearly for squirrel and deer since its establishment. Success has not been exceptional but hunter opportunity has been furnished for the general public.

Squirrel. Hunts on the area were for still hunting only and season length permits were issued prior to the opening date. Hunting pressure was light during the biennium.

In 1962, only 54 random hunter bag checks were made with 266 squirrels being seen. This veraged 4.92 squirrels per hunter effort.

In 1963, hunting pressure was lighter than for ne previous year. Drought conditions existed nd hunter success was low.

Deer. East Carroll G. M. A. was open for rchery and gun hunters the past two years. archery participation was low and no deer were illed.

In 1962, the area was open to a 5 day gun eer season for bucks only with 3 deer being illed and 132 hunting efforts being made. This oes not show a true picture of the number of deer present on the area.

In 1963, hunting pressure increased and the kill totaled 144 during the 5 day any deer season with 1,682 hunting efforts.

RUSSELL SAGE WILDLIFE MANAGEMENT AREA

E. S. "JACK" RUSHING

Area Supervisor

In 1960, the Louisiana Wild Life and Fisheries Commission purchased the 15,000 acre Russell Sage Wildlife Management Area in LaFourche Swamp east of Monroe, Louisiana. This land was bought for wildlife purposes and is being developed for maximum public recreational use.

During the past biennium considerable work has been accomplished regarding routine projects as establishment of boundary lines, erection of entrance markers, clearing and brushing of access roads, and the construction of a headquarters building and equipment barn. Also, five existing bar-pits were improved for fishing, several food plots were cleared for turkey habitat improvements, 20-30 artificial salt licks were established for deer, twelve wild turkeys were released on the area, and construction work was begun on a 2500 acre green tree waterfowl impoundment.

Trapping efforts pay off. Shown are Cliff Williams, District Supervisor, Jerry Farrar, Biologist, and Jack Rushing, area supervisor, releasing wild turkeys on Russell Sage.

Entrance Marker on the Commission owned Russell Sage Wildlife Management Area in Lafourche swamp east of Monroe. The first land purchased by the Louisiana Wild Life and Fisheries Commission primarily for wildlife and recreational purposes.

Managed Hunts

The area has been open to the general public for hunting each year on a still hunt basis. Season length permits were issued prior to the opening date of the regular hunting season.

Squirrel. In 1962, squirrel hunting on Russell Sage was very good and hunter success was very high. A total of 241 random hunter bag checks were made by district personnel which included a kill of 836 squirrels, an average of 3.46 squirrel per hunter effort.

In 1963, squirrel hunter success was very low due to severe drought conditions and low hunter participation. Squirrel bag checks were few, but most hunters killed none to 1 or 2 squirrels while a few were lucky enough to bag 4 to 6. Squirrel kill increased as rainfall increased.

Deer. Most of LaFourche Swamp was restocked with deer in the middle 1950's and the first legal deer seasons were held during this biennium. This was the result of three successful deer releases on and adjacent to Russell Sage. Archery hunters during the past two years killed 4 deer. More pressure was received in 1963, and 3 deer were known to be taken with bow and arrow.

In 1962, hunting pressure during the gun season was actually low on this wildlife management area because of the large areas opened to deer hunting in north Louisiana for the first time. Hunter success was good and approximately 35 bucks were killed. The deer herd is on the increase and the removal of any sex deer will be necessary within the next few years.

In 1963, hunting pressure greatly exceeded that of 1962. Sportsmen were more familiar with the area and better access was available. The deer kill was estimated at around 60 animals.

UNION PARISH GAME MANAGEMENT AREA

CURTIS L. HOLLIS

Area Supervisor

The Union Parish Game Management Area is located in the north central part of Union Parish about 3 miles west of Marion, Louisiana. Wildlife habitat consists of pine and mixed hardwoods with a moderate to heavy understory. Logging operations on the area during the past biennium should improve deer browse conditions considerably. Most of the project work during the past 2 years has been toward maintenance and management. This included work on boundary lines, access roads, food plots for turkey habitat improvement, and controlled hunts for the general public.

Managed Hunts

Controlled hunts were held in 1962 and 1963 for squirrel, rabbit and deer on a still hunt basis. Separate seasons were held for archery deer hunters and for those wishing to hunt with guns only.

Squirrel. A 37 day squirrel season was held in 1962 and spot bag checks of hunter success were made by district personnel. These checks indicated that hunter success was good and averaged 3.51 squirrels per hunting effort.

During 1963, a 23 day season was held with hunting pressure and squirrel kills being very low. This is not a true indication of the existing squirrel population because drought conditions were severe and hunter participation was practically nil except for the first days of the season. Yet, the hunters were able to bag a few squirrels.

Deer. Archers killed no deer during the past biennium, but approximately 100 hunting efforts were made each year. This is an increase over past years and many hunters were able to obtain shots at deer during the 1963 season.

In 1962, a bucks only gun hunt was held on the area from November 23 through 27. Hunting pressure was light and road conditions were very bad. A total of 145 hunting efforts yielded a kill of 6 deer.

Installation of water control structure on the LaFourche Public Shooting Area in Richland Parish.

In 1963, the area was open to 5 days any deer hunting or until 50 deer were killed. Hunting pressure was heavier than for the previous year. A total of 511 hunting efforts were made and 49 deer were killed.

FINCH BAYOU PUBLIC HUNTING AND FISHING AREA

The Finch Bayou Public Hunting and Fishing Area is located in Union Parish about 4 miles east of Haile, Louisiana and comprises approximately 600 surface acres of water. It is subject to overflow from the Ouachita River and good fishing is seasonal.

The area was drained during the summer months of 1962 and 1963 to permit repairs to transmission pipe lines crossing the lake. This affected sportsman participation since available water occurred only in the main channel bed.

More benefits have been reaped from the fishing aspect of this area than for hunting. Some waterfowl shooting is enjoyed on the western parts of the area. Drought conditions existed in 1963 and the area should be re-flooded in early 1964.

FISHER CREEK PUBLIC HUNTING AND FISHING AREA

The Fisher Creek Public Hunting and Fishing Area was leased through the courtesy of the H. L. Hunt Oil Company and the East Carroll Parish School Board for use by the public as a hunting and fishing area. It is located three miles west of Sondheimer, Louisiana in East Carroll Parish.

The area covers approximately 500 surface acres of water. Fair waterfowl shooting and fishing were available to the general public the past two years. Areas near the East Carroll Game Management area provided the best waterfowl shooting.

No work was accomplished on this area during the last biennium, but entrance markers will be replaced at the main access points in 1964.

LAFOURCHE PUBLIC SHOOTING AREA

The LaFourche Public Shooting Area is located in Richland Parish approximately 10 miles west of Rayville on U. S. Highway 80. The main objective of this area is providing small game and waterfowl hunting. It comprises 1875 acres of bottomland hardwoods of which 1200 acres is managed as a green tree waterfowl impoundment. This area is flooded by means of gravity water flow via bayou and canal from Irwin Lake which is located to the north.

Levee and control structure damage from heavy rains and floodwaters made the waterfowl area unusable in 1962, but repairs were completed prior to the 1963 season. Waterfowl hunting was fair to good. Considerable planning has been done with the Louisiana Department of Highways to reduce the effects of the U. S. Inerstate Highway 20 which will divide the area nto two segments.

SHILOH CREEK PUBLIC HUNTING AREA

The Shiloh Creek Public Hunting Area is located 5 miles west of Vaughn, Louisiana in Morehouse Parish. It borders Terzia Refuge on the north and consists of 1200 surface acres of water.

Shiloh Creek is referred to as a green tree mpoundment and was established primarily for waterfowl hunting. In order to do this, a dam was placed across Shiloh Creek and a water control structure installed to regulate the water evel.

The area has provided good waterfowl shootng and fishing. Mallards frequent the area and fishing is usually good from the Ouachita River to the shooting area. One advantage which occurs here is its location within the Ouachita River bottom, a spot noted for its duck hunting.

TERZIA REFUGE

The Terzia Refuge is located 5 miles northwest of Bastrop, Louisiana in the west central portion of Morehouse Parish. It supports a good deer and turkey population. Competition is great between wildlife and the free ranging cattle and hogs for native browse and mast. This refuge is one of the oldest in the state and provides no direct benefit to the hunters. The reason for this is the strong local opposition to opening this area for managed hunts.

During the past biennium the exterior boundaries have been maintained and a turkey trapping program was initiated.

Turkey trapping on a part-time basis yielded twelve wild birds for restocking on the Russell Sage Wildlife Management Area in District II and the Bodcau Game Management Area in District I. This operation will continue until the Spring of 1964. All birds will be released on game management areas furnishing good wild turkey habitat.

DISTRICT III

CLYDE E. HARRISON
District Supervisor

ROWLAND VERNON
District Biologist

RAYMOND PALERMO
District Biologist

District III, with headquarters in Alexandria (Postal address Tioga) comprises six parishes: Winn, Grant, Natchitoches, Sabine, Rapides and Vernon in central and west central Louisiana. The following game management Areas are included: Catahoula, Evangeline, Red Dirt, Alexander State Forest, Sabine, Ft. Polk and Lutcher-Moore. In addition to the management areas the Waterfowl Refuge (rest area) on Catahoula Lake is administered through the district. This is a small centrally located rest area designed to prevent shooting pressure from driving the waterfowl completely from the lake during the hunting season. There is also a small research area in Winn parish on which cooperative research with the Southern Forest Experiment Station personnel is being done on the effects of deer on the native browse plants at different stocking levels. This area as well as the Catahoula, Red Dirt, Evangeline and portions of Ft. Polk Game Management Areas is located on portions of the Kisatchie National Forest.

CLYDE HARRISON
Supervisor, District 111

ALEXANDER FOREST GAME MANAGEMENT AREA

T. EARL DEEN
Area Supervisor

The Alexander Forest Game Management Area, approximately 8,000 acres in size, is located on Louisiana Forestry Commission lands in central Rapides Parish near Woodworth. The topography varies from gently rolling hills to steep hills. Drainage is good with several large creeks and numerous intermittent tributaries well dispersed over the area. Timber type is varied, pure stands of various age shortleaf and loblolly pines occupy the gently rolling hills, shortleaf-loblolly-mixed hardwoods are found on the steep hills, and bottom land hardwoods make up the forest along the stream bottoms.

This area became a management unit in late 1962 and should be able to maintain good squirrel and deer populations. Management activities have been limited to posting the boundary and some deer trapping. Forty-eight deer traps were hastily placed on the area in the winter of 1962 and seventeen deer trapped and released in Natchitoches Parish. Trapping was hampered by free ranging hogs and cattle. Time has been available to select more promising trapping sites

This is a scene of deer trapping in District III by personnel of the Fish and Game Division. This field operation is being supervised by Roland Vernon, biologist, assisted by other district men. Deer are being removed from areas of heavy populations to sections that have no deer. The deer trapping and transplanting program is several years old but will continue until the entire State is stocked and may boast of a deer season.

and many of the traps have been relocated. It is anticipated that trapping success will be much greater during the coming trapping season.

A preliminary trapping effort was made a few days in October and November with twelve deer taken. Eight were placed in two 29-R study enclosures and four released on Lutcher-Moore Game Management Area in Vernon Parish.

As yet no managed hunts have been held on this area as there are still several places in Louisiana that are suitable for deer stocking and this unit is currently being used as a source of deer.

CATAHOULA GAME MANAGEMENT AREA

VOLMER BOWEN

Area Supervisor

Catahoula Game Management Area is withi the Kisatchie National Forest and is available t hunters through the cooperation of the U.S Forest Service. Located in northern Grant an southern Winn Parishes it comprises about 40 000 acres of longleaf, loblolly, shortleaf pines i pure and mixed stands. Hardwoods are found intermixed with the pines and are found in pur stands along the stream bottoms. The topograph varies from gently rolling hills to poorly draine flats.

Squirrel, rabbit, and deer may be hunted o this area at designated periods. Season permit are given to all applicants for squirrel and rabbit hunting while deer hunters are given dail permits and are required to check in and out During the 1962 hunts, spot checks of hunter during the first four days of the hunt, indicate an average kill of four squirrels per effort. During the 1963 hunts, the average kill fell to 1. per effort. 1,927 hunting efforts were made i 1962 for deer with 53 animals taken. This was bucks only hunt. The 1963 deer hunt was fo either sex during the first day with the remaining four days for legal bucks only. A total o 2,688 hunting efforts were made during this hun with 110 does and 116 bucks taken.

Other than the hunts, management activitie have consisted of bush hogging supplementa food plots, preparing approximately thirty mile of combination access roads and wildlife openings, boundary maintenance and miscellaneou repairs. Access roads were opened for the convenience of the hunters as well as to provide game openings.

Deer being released in Natchitoches parish by Clyde Harrison, Supervisor District III and Earl Deen, Game Management Area Supervisor. The Commission's trapping and transplanting program has increased the deer population over the state and hunting opportunity. This program will continue until all deer range areas have been stocked.

EVANGELINE GAME MANAGEMENT AREA

T. EARL DEEN

Area Supervisor

This area is located in central Rapides Parish bout twenty miles south of Alexandria. Owned rincipally by the U.S. Forest Service, it became game management area in 1949. Its 15,000 cres are primarily pine with scattered hardvoods. Greater densities of hardwoods are found n the several stream bottoms. This area may be escribed topographically as gently rolling and vell drained.

Squirrel, rabbit, and quail hunting are pernitted for specified periods with a season permit iven to all applicants. Five day deer seasons vith each hunter checked in and out of the area as been the pattern for the past several years. n 1962 the deer hunt was limited to legal bucks nd 1,218 hunting efforts resulted in a kill of hirty-three animals. In 1963, hunters were pernitted to take deer of either sex the first day vhile only legal bucks were taken during the last our days. During the period of this deer hunt ,314 hunting efforts were made. Hunters took 9 deer, 54 does and 45 bucks. Spot checks of quirrel hunters in 1962 indicated an average kill f 1.6 per hunter. During the 1963 hunt, the verage kill dropped to 1.1. A relatively small umber of quail hunters were sampled with an verage kill of 1.8 birds for the 1962-63 season.

Routine activities included boundary and road naintenance, cabin maintenance, supplemental uail and deer food planting and various minor uties.

FORT POLK GAME MANAGEMENT AREA

ROBERT M. DEASON

Area Supervisor

The Fort Polk Game Management Area is loated in central Vernon Parish and consists of pproximately 50,000 acres leased from the U.S. Army and U.S. Forest Service. The terrain may e described as rolling to hilly high ridges with he major creek bottoms between the ridges. Timber type on the high ridges is primarily long eaf pine, although loblolly pine-hardwoods is found in some sections. On some sandy sections f the ridges, pure stands of sandjack oak may be found. In the creek bottoms hardwoods predominate, with various oaks, beech, magnolia, sweetgum, and minor species making up the forest over. Abundant game species found here include deer, squirrel, quail, doves, and at times, woodcock.

The Wildlife and Fisheries Commission began management operations on this area in 1960 and when not in conflict with Army training, the area has been open for hunting for any species in season. Hunters are required to secure a daily clearance from the Fort Polk Provost Marshal. Relatively few hunters have made use of this area, possibly due to the necessity for daily clearances from the military. During the 1962 hunting season approximately 1,550 daily clearances were issued, and as of December 1, 1963 6,837 were issued for the 1963-64 season. Due to the manner of operation of this area the number of hunting efforts for a given game species, as well as game taken, can not be determined. Spot checks are made and during the 1962-63 season resulted in the following information: about

This spike buck was shot by Jerry Hood, age 11 of Rosepine, on the Fort Polk Game Management Area. The Game Management Area program has proved very successful in providing hunting areas and opportunities for Louisiana's sportsmen old and young.

These two deer were killed on the Fort Polk Game Management Area. Jack Ford of DeRidder (left) is shown with his nine-point buck, and Lonnie Ashworth of Leesville, an ordnance mechanic on post, with his seven-point buck.

fifty deer were taken; hunters bagged 2.1 squirrels per effort; quail hunters averaged four birds per effort; no figures are available for doves or rabbits. During the 1963-64 season the deer hunt was held in two sections, the first was in conjunction with the still hunt in sections of Vernon Parish during the period November 9 through November 24 and was for legal bucks only. The second section was for three days beginning November 29. Approximately 4,845 hunting efforts were made during the first section with 125 deer taken. During the latter period hunters were required to check in and out daily and have their kill checked. A total of 702 hunters participated in this three day hunt that was for deer of either sex and took 45 deer, 27 females and 18 bucks. The 1962-63 season for doves and squirrel was rather poor with few doves taken. Squirrel hunter bag checks indicated a kill of 1.4 per hunting effort. Figures for quail hunting are not available at the writing of this report.

Other activities included boundary maintenance, preparing five one acre supplemental quail food plots, construction of a fifteen acre hunter camping area, disking 150 acres of dove food plots, and minor jobs. The dove plot work consisted of simply disking bare ground to stimulate goat weed and was accomplished by the U.S. Army.

RED DIRT GAME MANAGEMENT AREA

H. C. BEASLEY

Area Supervisor

The Red Dirt Game Management Area, located in central Natchitoches Parish is located on U.S. Forest Service lands and is approximately 38,000 acres in size. Topographically it is made up of gently rolling hills and is considered well drained. Three main streams are found on this area with numerous intermittent streams and drains well scattered over the entire area. Primarily long leaf pine in natural stands, the forest cover includes hardwoods on some of the sandy ridges as well as along the major streams.

This area became a management unit in 1942, but did not become active until 1948. Excellent deer and quail populations exist here with squirrels being a minor game species. Efforts have been made to establish wild turkeys on the area but as yet have not established a huntable population.

Management and maintenance activities are probably more varied here than on the other units. An extensive series of supplemental food plots have been developed to assist the turkey effort and are planted to have winter and summer food available. Deer and smaller game use these plots considerably. Squirrel, quail, and deer hunts have been held on the area with the following results. In 1962, spot checks indicated the average hunter bagged 3.3 quail and 1.8 squirrel and during the deer hunt which was for leg bucks only, 2,054 hunting efforts were made wit forty-two deer being taken. In 1963 the qua hunt has not been held at the time of this repo and the squirrel hunt was very poor. Spot check showed an average kill of 1.2 squirrels per effor The five day deer hunt was held November 2 through December 3 with 2,650 hunting effort being made. During the first day hunters coul take deer of either sex. The last four days onl legal buck deer could be taken. During the cours of the hunt 250 animals were taken, 129 buck and 121 does. Many other routine jobs wer accomplished on the area during this period. Included are fence, road, bridge, and boundar maintenance. Numerous items of equipment hav been constructed by the Area Manager to be use by this project as well as others. Once a tim consuming and productive job, during the pas two years only a very little effort was devote to deer trapping.

In addition to the management activitie several research problems are under study o this area.

LUTCHER-MOORE GAME MANAGEMENT AREA

WOODROW SMITH

Area Supervisor

The Lutcher-Moore Game Management Are became one of the Commission units in November of 1960. It is located in southwestern Verno Parish about twenty miles southwest of Leesville The major portion of the area is the property o the Lutcher and Moore Lumber Company wit lesser acreage belonging to the Southwester Improvement Company and Kirby Lumber Company. It includes about 55,000 acres of cutove longleaf pine lands, most of which has bee planted to slash pine. Many small branches o "greenheads" are present throughout the area converging to form lush creek bottoms wher hardwoods predominate.

Squirrel and quail may be hunted with seaso permits. The area has been stocked with dee and the nucleus herd is increasing. Currently small game may be hunted by season permit During the 1962-63 season hunters averaged 2.7 squirrels and 2.6 quail per effort. Little activity was noted on other game species. In 1963-64, the same game species may be taken. At the time of this report only the squirrel season is in progress and to date spot checks of hunters have shown that the average kill per hunter is below that of last year about one squirrel per effort.

A house trailer has been established as area headquarters and has electricity and water. Management activities have included the establishment of eleven supplemental quail food plots and road and boundary maintenance.

SABINE GAME MANAGEMENT AREA

JOHN I. GENTRY
Area Supervisor

This section of central western Sabine Parish ecame a management unit in July of 1953 and ew ten year leases from private and industrial andowners were secured in 1963. Located a few niles south and west of Zwolle and consisting f approximately 12,000 acres, this area is about alf loblolly-shortleaf-hardwoods and a half hardvoods normally found associated in stream botoms. The northern piney woods section is well rained with numerous small intermittent streams vhile drainage is poor in much of the southern ection. Water and willow oat flats are found in uch areas.

Deer were stocked on this Game Management Area and have been hunted the past several years. The only other game species occurring in suffiient numbers to justify hunts are squirrels. So ar this particular area has not attracted many hunters. In 1962, the five day deer hunt in November drew 140 hunting efforts and only two leer taken. The 1963 hunt, also for five days was or deer of either sex for five days. A total of 51 hunting efforts were made and 21 deer hecks were made during the 1962 season but in 1963 bag checks indicated the average kill per ffort to be 1.6 squirrels.

In January 1963 the current Area Manager was hired. He has taken care of this area in an excellent manner and has been very helpful on other areas.

DISTRICT IV

DEWEY W. WILLS
District Supervisor
ROBERT B. KIMBLE
District Biologist
(Acting District Supervisor)
HOWARD R. BLOUNT
Biological Aide

The Fish and Game Division's District IV is comprised of seven parishes within the northeast portion of the State: Madison, Tensas, Franklin, Caldwell, LaSalle, Catahoula and Concordia Parishes. There are three game management areas in the district. They are Chicago Mills 102,000 acres, Caldwell 12,000 acres and Concordia 10,650.

Most of the work in District IV is done on the game management areas; however various jobs within the district pertaining to deer range surveys, re-stocking of game in some areas, game research, waterfowl habitat investigation on Catahoula Lake, and many other related game problems that arise are handled by district technicians. Personnel of the district are called on for assistance and guidance in wildlife work by sportsmen groups, individuals, and other public agencies.

ROBERT KIMBLE
Acting Supervisor, District IV

CONCORDIA GAME MANAGEMENT AREA

The Concordia Parish Game Management Area was established in the winter of 1963 upon lands belonging to several different landowners. The area is located in the north-western portion of Concordia Parish approximately two miles west of Ferriday, Louisiana. The size of the area is approximately 10,630 acres of which 7,400 acres are owned by Panola Land and Development Co., 1030 acres owned by Fisher Lumber Corporation; 960 acres owned by James C. Cochran; 1240 acres owned by Mrs. Mary Bullis. This area is leased from the above landowners solely for the purpose of game propagation and management for a period of ten (10) years at no cost to the Commission.

The Concordia G.M.A. lies within the Mississippi alluvial flood plains, which is slightly undulating (ridges and bottoms), and for the most part has a heavy sharkey clay soil type. The cover type is mixed bottomland hardwoods, the main species being water and willow oak, sweetgum, ash, honey locust, overcup oak, bitter pecan and cypress. The understory is composed of palmetto, blackberry, swamp dogwood, smilax, rattan, peppervine, trumpet vine, haw bushes and other shrubs and vines.

The land use is primarily timber production. Three fields comprising approximately 300 acres are being leased out and farmed to soybeans and corn. These fields are located on lands owned by Panola Land and Development Company and their future plans call for these fields to be planted to mixed hardwood seedlings in the very near future.

Development Possibilities

A. *Squirrel*—This area now produces a high population of both gray and fox squirrels. One of the best tools in squirrel management is to harvest the annual surplus crop. Because of the need for public hunting lands in this district it would be desirable to set the season with the regular state wide squirrel season, thus providing maximum hunting opportunity.

B. *Deer*—As has previously been mentioned the area is used mainly for timber production, therefore logging operations will be beneficial to deer. At present there are few deer on the area. Additional protection provided by the hiring of a full time G.M.A. Supervisor will aid in developing this herd into a huntable population. A deer release of a few animals may speed up development of the herd. The area is capable of supporting a high deer population and will furnish many hours of hunter opportunity when properly managed.

C. *Turkey*—The area should be rated very high as a potential turkey habitat. There are numerous open acres in roads, power and pipelines, and berms along canals which will furnish excellent feeding and nesting areas for turkeys. The abundance and varieties of oaks will furnish mast which turkeys relish. It would be desirable to make a release of wild turkeys on the area if and when such are available.

D. *Waterfowl*—Some of the more prominent bottoms of the area show good potential from a waterfowl standpoint in the form of green tree reservoirs. A small earthen dam and control structure across some of these bottoms may furnish many hours of duck hunting for the public.

Work has already begun on planning and plotting on maps the establishment of the exterior boundary line and development of hunter access roads. The establishment and maintenance of boundary lines plays an important part in the function of any Game Management Area. Such lines, when properly marked, help in the prevention of illegal hunting and contains hunters on the area when differential seasons between the G.M.A. and the surrounding areas are in progress.

Plans and specifications are being formulated to develop the Concordia Game Management Area into a very good wildlife area and to provide the maximum amount of usage by the general public. We must realize that wildlife improvements and other development projects scheduled for the area cannot be completed in a short time and must be of a long range type covering a period of several years.

Plans for the development of any wildlife species should be so constructed as to allow revision from time to time for the betterment of that particular game as the need arises. Hunters will start realizing major benefits from this area in the near future when this proposed game management program begins to pay off in dividends in the harvest of surplus game annually.

LaSALLE QUAIL DEVELOPMENT AREA

The LaSalle Quail Development Area is located approximately three and one-half miles north of Jena, Louisiana. This project was set up in 1955 on lands owned by the Bodcaw Cor pany.

Twenty-five food plots of from 1 to 3 acr each were established and various types of qua food plants were planted. These plots were plac at intervals, scattered at strategic locations ov several thousand acres of rolling, long-leaf pi country. The soil type is deep sand, which beginning to support vast thickets of pine see lings in the 1″ to 5″ diameter class. In the n too distant future, what was once wide ope heavily cut-over long leaf pine will be den thickets of a new pine generation, too dense successfully harvest quail.

During the spring of 1962 all quail plots we checked regularly as to the variety and quanti of quail foods found growing. During the ear summer the plots were bush-hogged to elimina undesirable plants and increase those that we desired.

Again in the spring of 1963 the plots we checked repeatedly. From our observations ar talking to people who hunt the area these plo are furnishing food which help in holding a hig population of quail in this immediate area. Tl preferred plants found most often and in abu dance were goat-weed and common lespedeza. A has been mentioned previously, no area, left u disturbed, remains the same year in and yea out. Therefore, the area in the vicinity of the plots sometime in the near future will change t a new plant succession which will not be as goo quail habitat.

LOUISIANA DEER DIE OFF

DEWEY WILLS and BOB KIMBLE

WHY DID THESE DEER DIE? This questio has been asked many times in recent month within wildlife circles. The question concerns th deer die-off that occurred in portions of Mad son and Tensas Parishes. The answer is not short one.

A complete answer to this question first re quires that the reader understand the factor affecting the regulation of animal population A population of animals in a suitable habita will multiply for a time with astounding rapid ity where there are no serious competitors, pre dators and parasites and where high quality foo is readily available. Such a population soon be comes out of balance with its environment. I other words the thriving population soon has in creased in numbers to the point that the onc adequate habitat can no longer provide qualit diet necessary to maintain the animals at pea physical condition. The animals become nutrition ally lowered. Ultimately the weakened animal wil fall victim to parasites and disease.

Thus, mother nature slows down the produc tion of young and eliminates the weak in a effort to make these animals maintain balanc with the environment. This illustrates the ter alled "carrying capacity" and simply means hat a given tract of land can support only a iven number of animals. When the animal population goes above this number both the condition f the habitat and the condition of the animals hemselves will deteriorate. Cattlemen have long nown of "carrying capacity" and have regulated heir herds accordingly in order to assure maxinum production.

With these basic principles of animal populaions under our belts let us take a look at the leer die-off in question. This die-off began sevral months ago and continued through the winer of 1962-63. A total of 313 dead deer were ound on areas surveyed by Louisiana Wild Life nd Fisheries Commission personnel. Losses were reatest in areas where abnormally high deer opulations were present and had long exceeded he carrying capacity of the range. Over-populaion which brought about browse or food shortge was the basic cause of the trouble. In a case f over population such as exists in the areas nentioned, deer die as the result of malnutrition, arasitism and of disease.

The process of malnutrition has been studied n detail. First the fat over the rump and the addle of the animal disappears. Shortly afterwards the deer begins to lose that slick early fall ppearance. As the fat under the skin is lost, the kin hangs loosely. Fatty tissue around the heart nd in the abdomen around the lower organs is sed up and its hairy coat appears rough and agged. The final state is an almost complete loss f fat from the normally creamy-pink bone marrow. A study of the large leg bone would show a red jelly-like marrow with the fat completely gone—proof of malnutrition. Examination of several fresh carcasses, general observation of some live animals, plus complete autopsies of two deer collected, completely substantiated suspiions of large scale malnutrition.

The deer in the areas surveyed have far exceeded their carrying capacity, as evidenced by heavy browsing on all available food. This segment of the state deer herd has been barely holding its own since 1962. With the extreme drought conditions that prevailed in the late summer and fall of 1962 the much overbrowsed range failed to produce the minimum requirements of available food for the existing deer. This decrease in available food brought about dangerous dietary deficiencies and triggered the chain of events leading to the die-off. The high deer population had sustained itself to a great extent by feeding on agricultural crops as browse shortages occurred in the wooded areas. Drought coupled with numerous severe freezes, hampered both sufficient growth of natural browse and agricultural crops. This consequently reduced the amount of food below that necessary to sustain the existing deer population.

As was the case in parts of Madison and Tensas parishes, the first to die were the weakest (the very old and the very young). Conditions were severe enough this past year to cause a very large portion of the deer herd to die of malnutrition. The much reduced population will now be in balance with the newly established carrying capacity of the deer range. The most important part of a deer die-off is often overlooked. Hunters suffer, since the much overbrowsed range will now only support a limited population, thereby causing a severe shortage in the number of harvestable deer. The small population remaining will continue to utilize all available food as it appears for a period of many years. If, on the other hand the deer had been properly harvested prior to the population peak, then there would be more food available which would in turn support a much larger number of deer. In other words, the deer herd should be managed so as to maintain an optimum population based

Game biologists Dan Dennett and Robert Kimble check browse conditions in the Madison-Tensas area. Browse plants are lacking or out of normal reach of deer. The most critical months for food are January through March each year.

on the carrying capacity of the area being managed.

Deer are almost universally under-harvested but many states are forced to adhere to rigid buck only laws or to have such limited antlerless deer seasons that many animals are wasted through disease and starvation. Deer die-offs have occurred in Louisiana in the past, and in all other major deer states of the country. Numerous deer died in highly populated areas in Arkansas late this winter. According to an article in "Michigan Out-of-Doors," sixteen million dollars worth of deer was lost to sportsmen in three recent winters when 139,950 deer died that might have been legally harvested. The state of Wyoming recently had its share of problems in some isolated areas with over populations of elk. These examples clearly emphasize valuable losses to sportsmen and die-offs such as these will continue to occur in years to come unless corrective measures are adhered to. There always have been and always will be some animals lost each year due mainly to old age, predators, accidents and poaching; but large scale die-offs need not occur.

Research has revealed that healthy deer herds can be maintained only by preventing the total number of deer from exceeding the natural carrying capacity of the range. Many progressive states have long known that this can be done, and a healthy deer herd sustained, by a proper harvest of both sexes each winter. It has been proven that as much as 30 to 35 percent of an already established deer herd can be harvested annually without damage to the following year's supply.

The possibility of a deer die-off in some areas of Louisiana was taken into consideration by the Louisiana Wild Life and Fisheries Commission when it made its recommendations for any deer seasons in 1962. While regrettable, it does not come as a surprise to Commission personnel, and certainly it will happen again if this valuabl natural resource is not utilized properly. W would like to point out again that the only logica solution for the prevention of future deer die-off is to maintain the size of the deer herd in balance with the range carrying capacity. This ca be accomplished only by the annual harvest o surplus deer of both sexes during any deer seasons that are recommended and set by the Louisiana Wild Life and Fisheries Commission.

Charles R. "Chili" Baur, Biological Aid, checking a buck killed by O. S. McDonald on the Caldwell Parish Game Management Area. Buck was 6 points and 1½ years old.

CALDWELL GAME MANAGEMENT AREA

WELCH LIVELY

Area Manager

This area, of approximately 12,000 acres i located in the southeastern part of Caldwel Parish. The area is open range for livestock except for approximately 4,000 acres which wa fenced against cattle in April 1961. The entir area contains a high population of semi-wil woods hogs. Inside the fenced area where cattl are excluded dense growth of vines and seedlin trees are beginning to grow. Associated with thi increase in vegetative growth is a fast developing deer population. This deer population ha reached such a high peak that an any deer season was recommended in the fall of 1963. It i felt that unless steps be taken at this time t harvest some of these deer, severe damage t young seedlings will result in the near future. Th over all condition of the deer herd will also increase by harvesting both sexes.

Squirrel—In 1960 the first managed squirre hunt was held on the area. However, the year since that time have seen a similar but longe season. In 1960 the season was opened on Octobe 1 and ended on October 9 with hunting permitte until noon only. The 1961 season was opene for squirrels from October 7 through October 28 Persons desiring to hunt made application t the District IV office. Permits mailed to the applicants were valid for the entire season on the area. The 1962 squirrel season was opened October 6 and closed on October 28. Again the area was opened for a managed squirrel hunt in 1963 which ran from October 5 through October 26. The following table illustrates the squirrel hunter success on the Caldwell Game Management Area.

CALDWELL G.M.A. (1960-1963)

Year	*Hunter Permits Issued*	*Hunters Checked*	*Squirrels Killed*	*Hunter Success*
1960	218	218	503	2.3
1961*	278	Hunters checked revealed about same success as 1960		
1962*	232	70	256	3.7
1963*	360	223	464	2.1

*Denotes sample check of hunters.

As has been previously mentioned 4,000 acres on the management area have been fenced against cattle. Our hunter bag check records which were conducted over the past four years do not reveal any gray squirrels being killed. Immediately following the close of the 1963 squirrel season on the area 33 gray squirrels, 15 females and 18 males, were brought in from south Louisiana, ear tagged and released at several selected sites (the thicket area) on the G.M.A. It is planned that during future squirrel hunting seasons as many hunter bag checks as possible will be made to determine if there was any reproduction and growth in population as a result of these releases of gray squirrels.

Deer—In 1962 the area was opened in conjunction with the regular state wide bow and arrow season for bucks only. We have no records of any hunter participation during the 1962 bow and arrow season. However, the area was again opened to bow and arrow hunting for either sex deer during 1962. This season was opened on October 26 and closed on November 24, Personnel assigned this district made periodic hunter bag checks on the area which revealed an average of 15-20 hunters per day with the weekends supporting the largest number of hunters. There was only one known deer killed on the area during this time and it was an 85 pound female.

Caldwell Game Management Area had its first managed deer season in 1961. During this time the season was opened for five days, bucks only, from November 24 through November 28. Another five days, bucks only, season was held from November 23 through November 27, 1962. The 1963 season again was for five days any deer or until 75 deer were killed with the remaining days bucks only. Two hundred and twenty-five (225) were killed the first day and 17 bucks were killed during the next four days. The following table illustrates all deer hunting data on the area since the first opening of the deer season.

		Sex			*Percent of Total*	
Year	*Hunter Efforts*	*Male*	*Female*	*Total Deer*	*Male*	*Female*
1961	 365	21	......	21	100	......
1962	 608	44	......	44	100	......
1963	1268	120	122	242	49.6	50.4

Miscellaneous Activities

The existing food plots were mowed regularly, and fences repaired where needed.

Boundary markers were replaced and boundary lines and jeep roads required periodic attention due to the water fluctuation over much of the area.

The main hunter access road has been completely re-worked and culverts installed. Hunters now have access through the area beginning near the north end and coming out the south end. More work should be done on this road to improve it to an all-weather road. A 10 foot X 14 foot timber bridge was built over a small intermittent stream, along with installation of two 30 inch concrete culverts along the south boundary line for better hunter access.

The overnight cabin has been remodeled to include addition of a trailer, which is used as a kitchen during the managed hunts. The cabin has been converted to sleeping quarters where up to seven (7) persons can be accommodated. A water well has recently been installed and the cabin is now equipped with running water. In general, Caldwell G.M.A. is an up and coming area. Acre for acre it will soon be comparable with any of the more prominent game management areas of the state. The records clearly show that there is an ever increasing number of hunters utilizing the area each year.

DISTRICT IV

CHICAGO MILL GAME MANAGEMENT AREA

JIM PERRITT
and
R. T. WILLIAMS
Area Supervisors

The 102,000 acre Chicago Mill Game Management Area is located in portions of Madison, Tensas and Franklin Parishes. The Franklin Parish portion of this Game Management Area comprising 22,000 acres was obtained by lease in May of 1961. The Madison Parish portion comprised of the old Singer Game Reserve and Ayers Refuge was converted to a game management area in May, 1961. These acreages along with the present 30,000 acres of the Chicago Mill Game Management Area gives a total of approximately 102,000 acres being operated as a game management area. The area is tentatively divided into two smaller areas and designated as Chicago Mill No. 1 and Chicago Mill No. 2. A game management area supervisor and a warden are permanently assigned to each of these two areas. Their duties, in addition to patrolling this large area, consist of maintenance of over 285 miles of boundary lines, up-keep of public access roads, participation in all managed hunts on the area, and many other pertinent duties in the normal operation of this game management area.

The year 1960 marked the opening of a succession of managed hunts on the Game Management Area. The results of these hunts are listed as follows:

SQUIRRELS—The Game Management Area was opened to squirrel hunting during the first nine days of the regular season in 1960. This hunt opened on October 1, and was ended on October 9 with hunting permitted until noon. In nine (9) days of squirrel hunting 1,115 hunters killed 1,913 squirrels for a hunter success of 1.17 in the 1960 season. In 1961 a random check of hunters on the area revealed that the hunter success was about equal to that of 1960. In 1961 and the years to follow, bacause of the lengthening of the season and having to check such a large area only spot checks were made of hunters on the area. An attempt was made to cover the entire area through this system of spot checks, and we did receive enough information to provide a random sample of the hunter success on the area. The 1962 hunt was for 21 days and spot checks revealed that 639 hunters killed 2,390 squirrels for a success of 3.7. The squirrel season for 1963 opened on October 5 and closed on October 27, 1963. Hunter bag checks made during this time revealed that 550 hunters killed 846 squirrels for a hunter success of 1.5 squirrels per hunter effort. It is interesting to note that the 1963 hunter success was less than half of 1962. This may have been due partially to a poor acorn mast crop during the fall of 1962 resulting in very little prime squirrel food, thus very poor reproduction for squirrels in the spring and summer of 1963 for this area of the state. The following table shows the hunting success of the managed squirrel hunts from 1960 to date.

CHICAGO MILL G.M.A. NO. 1 and 2
1960-1963

Year	*Hunting Efforts*	*Total Kill*	*Hunter Success*
1960	1115	1913	1.7
1961*	2367	Unknown	Approx. same as '60
1962*	639	2390	3.7
1963*	550	846	1.5

*Sample check only.

DEER—A bow and arrow season was held on the area during the 1962 regular statewide hunt. Hunters were issued a season permit upon request by letter. Several spot checks were made by district personnel to determine hunter participation and hunter kill. From our observations there was considerable use of the G.M.A. by bow hunters. There were no known kills on the area, however spot checks on the G.M.A. revealed that several individuals were successful in "getting a shot" at deer. Again during 1963 the season was opened for bow and arrows. Personnel conducting spot checks recorded 7 deer being killed on the G.M.A. Of the 7 deer, 5 were fema and 2 were males.

A group of deer hunters the night before the opening day. Camps fires and talk of the next day's hunt is the topic of conversation.

A five day deer hunt was held on the Chica Mill Game Management Area during 1960 a this length of deer season has remained t same through 1963. In 1960 the first four da was for bucks only, the last day bucks and doe On the Franklin portion only bucks were leg during the five day hunt. In 1961 all five da were for bucks only on the entire area. In 19 both sexes were legal the first two days in on the 28,000 acres that lie in Tensas Parish. Eith sex was legal or until 1,000 deer were killed du ing 1963. All hunters were checked in and out the Game Management Area during these speci managed deer hunts. The following table list t results of these deer hunts made on the Ga Management Area.

HUNTING PRESSURE AND DEER KILL
Chicago Mill No. 1 and 2
1960-1963

Year	*No. Hunters*	*Kill*			*Per Cent of Total Kill*	
		Male	*Female*	*Total*	*Male*	*Fema*
1960	9,359	417	329	746	56.0	44.0
1961	5,182	259	......	259	100.0	......
1962	8,357	467	377	844	55.3	44.7
1963	11,888	702	658	1,360	51.6	48.4

TURKEY—The first turkey hunt was held o Chicago Mill G.M.A. between April 8 and 1 1961. There were 1,300 permits issued and a estimated 26 birds killed during that time. I 1962 the season was for 9 days again and opene from April 7 through April 15. The District I office personnel issued 1,044 permits by mail an it is believed that approximately 38 turkeys wer killed on the G.M.A. In 1963 the season wa lengthened to 16 days and the District IV offic issued approximately 1,000 permits by mai Hunter participation on the area was good, bu only an estimated 23 gobblers were bagged durin this period.

Miscellaneous Activities

In general, activities on the Game Managemen Area in recent years have been maintained except for the managed hunts. The deer trappin program in the Madison Parish portion has terminated due to a decrease in demand for dee and also a new and less expensive method o capturing deer in the marshes of the State.

The overnight cabin on the Madison Paris portion has been enlarged and a kitchen and bat added along with the recent installation of water well. This cabin is capable of sleeping u to 12 men during the managed hunts.

An equipment storage barn was built at th site of the overnight cabin on the Tensas Paris portion. This barn will house the two Ford tractors, disc and two bush-hog attachments plu road signs and many other items for use in normal operations of the Game Management Area

Several miles of logging roads, jeep roads, pipenes, etc. are bush-hogged at intervals during ach year for two purposes (1) to make available ood feeding areas for turkeys, and (2) to keep pen hunter access roads. Several miles of boundry line were brushed out by use of a state owned)-6 dozer on the west side of the Madison Parsh area and on the Franklin Parish portion durng the past two years. Maintenance of boundy lines is a continuous operation on this vast rea.

DISTRICT V

JACK A. SIMS
District Supervisor

DeRIDDER AIRPORT PUBLIC HUNTING AREA

This area is located on the DeRidder Airport pproximately five miles west of DeRidder, La. The area is about 800 acres in size and owned by the Beauregard Parish Police Jury. Under an greement with the Louisiana Wild Life and isheries Commission this area is left open to he public for hunting.

The Commission has in the past planted welve acres of food plots on the area. These plots were planted primarily for dove and quail, but also are readily used by rabbits. These plots were planted to Brown Top Millet in the summer of 1962. Due to a livestock problem on the Airport, a new fence was constructed and this area is now grazed by cattle. For this reason he food plots were not planted in 1963.

The area is opened daily during the dove and quail seasons and hunters may come and go at heir will.

GUM COVE BLACK FRANCOLIN RELEASE AREA

The second shipment on Black Francolins were placed in the holding pens on February 9, 1962. These birds were conditioned for about ten days and released. There were 201 birds in this release of which 101 were males and 100 were females. This brings the total number of birds released to 311 with a sex ratio of 170 males and 141 females.

During the past two years Commission personnel have made numerous checks on the release area. Birds are seen on nearly every trip with the numbers seen depending on the time of the year. During the spring and summer many males are observed calling from fence post and ditch banks. It is very seldom that females are seen. After inquiring from people who are familiar with this bird in its native habitat, we find this is to be expected.

Several broods of young have been reported by workers on the R. A. Moore Ranch. It is felt that possibly many broods are not observed because of the restricted human activity on the area. Observation reports of birds show that approximately 30 per cent of the birds are not banded, which indicates they were hatched and reared locally. Even though the picture looks very bright at the present it will still be several years before the final outcome of this release is known.

JACK A. SIMS
Supervisor, District V

Exotic Game Bird Production Area

This is a new project which was begun in the spring of 1963. This project was made necessary due to the fact that Louisiana wanted to try releases of several exotic game birds which could not be secured from their native countries.

The area is located adjacent to the District V (5) office on the DeRidder Airport. Pens were built to house the Red Junglefowl and Black Francolin breeding stock. An old warehouse was converted into a hatching and brooder house. There are now four Red Junglefowl pens and four Black Francolin pens on the area. There is also one large flight conditioning pen into which

Jack Sims, Supervisor District V, Louisiana Wild Life and Fisheries Commission holding a Black Francolin while band is being placed on leg. All birds are banded for research purposes.

Junglefowl, about the size of a bantam chicken is receiving research attention in Louisiana. The first release of these birds was made on the Idlewild research area in East Baton Rouge parish.

birds are placed at about six weeks of age and remain until they are ready for release. During the first year of operation all eggs were hatched under bantam hens. The hens remained with the young birds for about four weeks.

Fifteen adult Junglefowl, 10 hens and five roosters, were received from Oklahoma in March 1963. These birds were raised at the Oklahoma State Game Farm in the spring of 1962. The birds were penned at the rate of either one male and two hens or one male and three hens. A total of 160 eggs were laid during the 1963 laying season. Eighty-eight chicks were hatched, 85 of which were raised and placed in the flight conditioning pen.

Fifteen Black Francolin breeders were received from the Alabama State Game Farm on April 1, 1963. These birds were penned at the rate of two hens to one rooster. Due to the late date of receiving the birds, only three hens laid producing 27 eggs. From these 27 eggs 16 chicks were hatched and 11 were raised to the age of release in the conditioning pen. All eggs were hatched and brooded by bantam hens.

Photograph 3 shows a pen used for housing Junglefowl breeders. Photograph 7 shows the Black Francolin breeding pen. Photograph 9 shows breeding pens and large flight conditioning pen. Photograph 16 shows hatching and brooding pens.

WEST BAY GAME MANAGEMENT AREA

E. E. GARLINGTON

Area Supervisor

During the period covered by this report most of the work has been considered maintenance and management. The seven food plots on the area have been established to permanent vegetative cover and are mowed annually. All of the salt licks are replenished each year.

The hunting seasons conducted on the Area during the period covered by this report are as follows:

SQUIRREL—During the 1962 squirrel season daily permits were required for hunters using the Area. The permit station opened at 5:00 A.M and closed at noon daily. There were a total o 7,393 squirrels killed by 3,296 hunters during th 23 day hunt. Of this total, 1,460 were fo squirrels and 5,933 were grays. During the 196 season, October 5-27, hunters were issued seaso permits prior to the hunt and were not require to check in and out daily. Due to this, the number of hunting efforts and total kill is not known

DEER—A five day managed deer hunt wa held on the Area during both the 1962 and 196 season. Daily permits were required with permi stations opening at 5:00 A.M. and closing a 5:00 P.M. During the 1962 season only lega bucks were taken. There were 5,522 permits issued during the 1962 season resulting in th taking of 135 deer. During the 1963 season a either sex season was held. Either sex was lega until the day the pre-set number of 400 dee had been reached or exceeded. This number wa reached the first day so hunts during the remaining four days were for bucks only. Ther were 8,072 permits issued during the 1963 seaso and 900 deer were taken from the Area. Tabl II gives the kill by days for the 1962 and 196 seasons.

TABLE II

Daily Permit and Kill Data
West Bay G.M.A. 1962-63

Date	*Permits Issued*	*Deer Checked*
11-23-62	1,733	77
11-24-62	1,569	36
11-25-62	1,046	8
11-26-62	449	3
11-27-62	383	5
11-28-62	342	6
TOTALS	5,522	135

DAILY PERMIT AND KILL DATA
West Bay G.M.A. 1963-64

	Permits	*Deer Checked*	
Date	*Issued*	*Doe*	*Buck*
11-29-63	4,041	446	409
11-30-63	2,048	......	22
12- 1-63	1,048	......	19
12- 2-63	530	......	2
12- 3-63	405	......	2
TOTALS	8,072	446	454

Deer Hunters congregate at West Bay Game Management Area checking station.

ARCHERY SEASON—An archery season was conducted on the Area during both the 1962 and 1963 seasons. During the 1962 season only legal bucks were taken, but during the 1963 season either sex deer were legal. The 1962 season was held from October 1-15 and the 1963 season was from October 26-November 24. During both years archery hunters were given season permits and were not required to check in and out daily. Due to the restriction of either sex hunting for the 1962 season, hunting pressure was light and no kills were confirmed. During the 1963 season the Area Supervisor confirmed 22 deer bagged on the Area.

DISTRICT VI

J. B. KIDD
District Supervisor

THISTLETHWAITE GAME MANAGEMENT AREA

Squirrel Hunts

Managed squirrel hunts were conducted on the Thistlethwaite Area for the fifth and sixth consecutive years during the 1962 and 1963 seasons.

Hunters in October of 1962 enjoyed the best hunting success experienced on the area since its opening in 1958. Good hunter success was predicted for the '62 season in 1960-61 biennial report. This prediction was made because of the excellent food conditions on the area in 1961. During 1962 the area was opened for 16 half days, October 6-21, with hunting being halted each day at noon. A second hunt was also allowed on the area for three days during the period December 14, 15 and 16. Hunters exchanged their licenses for daily permits and reported back to the permit station to have their squirrels examined. These two hunts resulted in the killing of 5,932 squirrels. Hunter success averaged 2.85 squirrels bagged per hunter in October and 1.14 squirrels in December. The two hunts combined revealed an average kill per hunting effort of 2.64 squirrels.

The hog control hunts on Thistlewaite Game Management Area produced an added hunting opportunity for the sportsman. A total of 1,477 hunting efforts were made and 103 hogs killed.

J. B. KIDD
Supervisor District VI

Although 1962 was a productive hunting year, the mast crop was extremely short. Because of this condition a poor hunting year, as was predicted, occurred in 1963. Total kill in October of '63 on Thistlethwaite was 62 percent lower than in 1962. Poor hunter success also had an adverse effect on hunter participation which was 32.4% lower in 1963 than in 1962.

A COMPARISON OF HUNTER SUCESS
1962-1963

Year	*No. Hunts Made*	*Fox*	*Gray*	*Avg. Kill Per Hunting Effort*
1962				
(Oct.)	1987	824	4885	2.85
(Dec.)	265	52	251	1.14
1963	1338	330	1812	1.60

Hog Control Hunts

Two separate hog control hunts were conducted on the Thistlethwaite Game Management Area during February, 1963. These hunts resulted in the removal of 103 hogs. A total of 1,477 hunting efforts were expended during the hunt. It is planned in the future to control the hog population on the area by opening it to public hunting.

THISTLETHWAITE GAME MANAGEMENT AREA
1963

Feb.	*Hunters*	*Hogs Killed*
1	742	36
11	122	19
12	95	7
13	120	9
14	106	9
15	94	14
16	198	9
TOTALS	1477	103

Deer Restocking

A total of 24 deer were released on the Thistlethwaite Area during January 1962. Including 14 previously released on the area a total of 38 animals were released for restocking purposes. It is believed the 10,000 acre area has been adequately stocked and deer release on the area has now been terminated.

St. Landry Parish

Fourteen deer were released in the closed section of St. Landry Parish immediately adjacent to the Thistlethwaite Game Management Area. Six deer were released on March 19, 1963 east of the management area and 8 were released north of the area April 9, 1963. All deer released were in good shape and were trapped and moved from the marshes of south Louisiana.

GRASSY LAKE PUBLIC HUNTING AREA

The Grassy Lake Public Hunting and Fishing Area is located in Avoyelles Parish about 15 miles north of Simmesport. This 26,000 acre area is located in a remote section of Avoyelles Parish, but offers some of the finest hunting and fishing opportunity that can be found anywhere in the state.

The area is open to the public to hunting and fishing. The most reliable access route to the area is by way of the Red River. Hunters may put their boats in at the Three Rivers Landing in Avoyelles Parish and go up the Red River to the area or they may come down the Red River to the area by launching their boats at Cocodrie in lower Concordia Parish. During the dry summer months a logging road is accessible into the area just east of Bordelonville.

This fine hardwood area has a good deer herd, an adequate supply of squirrel and rabbits and offers some of the best bass and bream fishing in the state in its many lakes and bayous. The wildlife resource of the area is present in good supply for the sportsman's use, but it does take some extra effort and ingenuity to realize its benefits. While there have been no accurate records kept of hunter use on the area since it was leased by the Wild Life and Fisheries Commission in 1950 there are many sportsmen each year who make very profitable hunting and fishing ventures in this vast area.

DISTRICT VII

HENRY D. ROBERTS
District Supervisor
TOMMY CHATHAM
District Biologist

SUPPLEMENTAL QUAIL FOOD PLANTINGS ON PUBLIC ACCESS LANDS

This project, initiated in the spring of 1957, consists of 38 fenced food strips (fenced against free-ranging cattle, as they are located in the heart of Louisiana's dairying industry). Lespedeza bicolor strips, established on one-third of each plot during the first two years of the project, have shown fair to excellent seed production during the last two years. This year (1963) in spite of excessive drought conditions the bicolor made its heaviest seed crop. If well establishe prior to drought, it seems to actually thrive o such conditions. Certainly it has done better thi year, than during the three previous years o high or excessive moisture conditions.

H. D. ROBERTS
Supervisor, District VII

Brown-top millet has been broadcast and fertilized on another one-third of each plot durin the last two years. It has made only fair see crops under such conditions, but apparently always produces enough to well justify its use.

The other one-third of each plot is left as "rough" of grass and brush to insure nesting an escape cover at all times.

Quail are to be found in or among these plot at all times of the year. They also afford a fai amount of rabbit hunting and a very limite amount of dove shooting.

ZEMURRAY DEER MANAGEMENT AREA

FRED JOINER
Area Supervisor
(to Sept. 30, 1962)
LOYD CUTRER
Area Supervisor
(since Sept. 30, 1962)

Trapping

No trapping has been done since the managed hunts were begun. An unsuccessful attempt was made during the trapping season immediately following the first hunt. Since then, it has been deemed unnecessary, as the deer herd seems to be well within the carrying capacity of the area. Of course, the trapping operation never did remove anywhere near the desired number of deer.

Managed Hunts

Three day managed hunts, for either sex deer, were held on this area in early December of both 1962 and 1963. In 1962, one hundred hunters per day were allowed on the area (300 hunters for the three days). Of the allowed 300, approximately 270 actually hunted. These brought out 36 deer.

The 1963 hunt allowed 110 hunters per day (330 for the season). Only 271 of the 330 made use of the permits issued to them. These 271 hunters brought out 37 deer, consisting of 18 ucks and 19 does. Weights ranged from 35 lbs., ive weight, to 133 lbs. All the animals brought ut were in good physical condition, and had very ew or no ticks this year (1963), as compared to xcessive infestation by them at all prior hunts. n several of the deer killed at the last hunt, no icks could be found; on only two of the 37 deer aken were the ticks numerous enough to be eadily noticeable.

Range Conditions

Browse conditions on the area are greatly improved over the 1960-61 status. The general ppearance of the deer checked during this hunt (1963) was much improved over those of the ast hunts, even though there was no noticeable ifference or increase in the weights. Of course, he weights tabulated this season have not been ompared to those of the past.

Antler formation seemingly is improved. No ragged or freakish formations were found, even though the racks seem to be small. During the early hunts of this area the antlers examined showed some of the most ragged, rough, and mal-formed growths that one could expect to encounter.

Improvements on the Area

A pitcher pump was installed in the cabin during the year of 1962.

The work of widening and building up the roads on the area is still in progress. A great deal of dozer work is being done, in pushing out trees and stumps along the roads. The motor grader then follows, building up the road bed and cutting the ditches. Culverts are installed in the low places where they are required. Gravel is spread on most of these culvert installations, as well as on some of the other rough stretches of road.

Deer Releases in District VII

The deer release in Washington Parish (at Mt. Hermon) was at last completed during 1962. This release probably has progressed and developed better than any other release made by the State of Louisiana. The Montpelier release (of 1959 and 1960) has done reasonably well, in spite of night hunting and almost constant harassment by dogs. The Fluker's Bluff and Bluff Creek releases have afforded two fair seasons of still-hunting (bucks only) to the eastern portion of East Feliciana Parish, the western portion of St. Helena Parish and the northeastern corner of East Baton Rouge Parish. This area had known no open deer season in some forty years, it is said. (This has not been verified).

In early 1963 a small deer release was made in the Tangipahoa River bottom near Kentwood. Another small one was made in the Natalbany River bottom west of Independence.

Beaver Trapping

Beaver trapping has been cut to a minimum. Where necessary, they are trapped, but in most cases the dams are blown out by dynamite, temporarily destroying their habitat. The beaver that are live-trapped are usually presented to the Louisiana State University Veterinary Science Lab for research purposes.

Beaver trapping as a full time project in Louisiana has been discontinued. The animals have become established over the entire state as a result of an earlier restocking and in some cases complaints have been received pertaining to damage similar to that in the Florida Parishes. Live traps are not being used except in sites where drowning sets with steel traps can not be made.

The man formerly assigned to the trapping program was transferred to Zemurray Park as Area Supervisor and only occasionally is called out on complaints of severe damage.

Beaver have been welcomed in many areas which have had releases made and in many cases have proven to be assets to the general overall water picture. Good fish ponds have been created which have also attracted fur bearing animals requiring aquatic habitat. These have also served as sources of drinking water for livestock and game animals.

Present trapping season for beaver begins on January 1 and runs through February 28. This is open in only seven Florida Parishes.

IDLEWILD PLANTATION

In 1957 Idlewild Plantation, comprising 1,800 acres, was leased to Louisiana State University. This lease ran until 1961, when it was renewed. Idlewild is composed of gentle rolling hills and creek bottom land of many soil types. Approximately one-half of the acreage is in timber. The Plantation is located approximately 30 miles north of Baton Rouge and 2 miles south of Clinton, Louisiana. Many of the Clinton residents know it as the old Camp H of the Louisiana State Penitentiary which had earlier leased the property from the East Louisiana State Hospital.

The L. S. U. School of Forestry has the use of portions of the farm on which graduate students design and conduct research programs, many of which are cooperative projects with the Louisiana Wild Life and Fisheries Commission. One of these is the rabbit research plot on which the Commission cleared five strips on one 80 acre tract, each strip approximately 50 feet wide and one-half mile long. Food preference studies were conducted by one student and rabbit censusing techniques tested by another.

The Commission released 47 jungle fowl on the area in December, 1963. These birds are exotic introduced from Asia and recommended by Dr. Gardiner Bump, U. S. Fish and Wildlife Service research specialist employed to head the Exotic Bird Introduction program which operates world wide. The jungle fowl were hatched and reared in the exotic bird rearing pens at DeRidder. Through the interest and knowledge gained from raising exotic birds as a hobby in the past, Jack Sims, District V Supervisor, has been able to do a very good job in producing these offspring from 15 heads of the brood stock obtained from the Oklahoma Department of Wildlife Conservation.

A spirit of sincere cooperation has been exhibited by the resident personnel of Idlewild as well as the teaching staff at L.S.U. These people have made it possible to conduct studies of a nature that would be total failures without their complete cooperation and participation.

WADDIL TRACT

This area is located 4 miles east of Baton Rouge and is bordered by the Comite River on the east and Flannery Road on the west. The property, 230 acres, was donated by Mr. Frank Waddil to the Louisiana Wild Life and Fisheries Commission and the Louisiana Forestry Commission in 1958, each organization to share joint ownership. In 1960 the Forestry Commission agreed to grant the Wild Life and Fisheries Commission full ownership due to the relatively small size and lack of merchantable timber. Recreational possibilities are far greater than the commercial timber potential.

Four ponds have been constructed on the area, each approximately one and one-half acre in size. Two have been stocked with fish and the other two will get fish at an early date. One of the problems encountered with the ponds is the tendency of the soil to remain suspended in the water, necessitating regular applications of gypsum or a similar material to cause the suspended particles to settle out.

Tilapia, a live-young bearing tropical fish, and largemouth bass were stocked in two of the ponds but since the former were released we have had two severe winters. This probably has eliminated all the tilapia.

Work was begun to clear camping and picnicking sites on the area. Plans have also been developed to erect a building of a type which would afford shelter to those using the facilities. It is hoped plans may be worked which might promote extensive use of the area. The proximity of Baton Rouge and its many people in need of easily accessible recreation facilities indicates a potential heavy use once the developments are made.

A fence around the entire tract has been erected. This is constructed of five foot net wire and two strands of barbed wire. Cattle wise this is effective, but it necessitates considerable mowing and cutting to keep roads and trails open.

This particular piece of real estate is ideally located in that it has a blacktop road running along a stretch of the western boundary, it has the Comite River on the east which admittedly has lost much of its attractiveness since it ha been deepened and straightened, and it is in eas driving distance of the city. When funds ar available it is likely the Waddil tract will b made into a very attractive recreational area serving a large number of people.

DISTRICT VIII

ROBERT A. BETER
District Supervisor

PUBLIC SHOOTING GROUNDS

District VIII activities during the prior tw years of this biennium were comprised of development operations on two marshland public shooting grounds. A total of approximately 70,000 acre are in the process of intensive development unde the auspices of the Pittman-Robertson Section Fish and Game Division. The Biloxi Marshland Public Shooting Ground, comprising 40,00 acres, is the largest of the two areas. Althoug the 30,000 acre Wisner Public Shooting Groun is somewhat smaller in acreage, it also offer splendid development opportunities.

Considering the extreme diversity of location vegetation and development aspects, these tw waterfowl areas shall be treated as separate entities.

WISNER PUBLIC SHOOTING GROUNDS

Project W-33-D

This public shooting ground has been active since May 11, 1958. The 30,000 acre tract of potentially good waterfowl land is leased from the Edward Wisner Foundation for a period of 10 years with a 5 year option to renew. It is located in the southeast portion of Lafourche Parish between Leeville and Grand Isle, Louisiana.

Boundaries start at the Southwest Louisiana Canal on the north, Gulf of Mexico on the south, Caminada Bay on the east and Bayou Lafourche on the west.

Actual physical developments began on this marshlands during 1959. During the interim period, a total of 14 wooden structures have been erected on the area. These 14 structures stabilize levels in approximately 10,000 acres of marshland. Water depths in bayous in which wooden structures are placed range in depth from 5 to 8 feet.

Due to the disposition of the marsh with the interlacing labyrinth of connecting bayous, ditches and lagoons it becomes necessary to construct numerous earthen levees in conjunction with the wooden weirs. The smaller ditches and deteriorated spoil banks along bayous are therefore closed by earthen fills.

All construction work was done with the normal complement of boat captain, dragline operator and dragline operator helper. Three temporary laborers are found to provide the most

ROBERT BETER
Supervisor, District VIII

onducive and practical arrangement feasible in ctual dam building.

The best procedure was to prefabricate, into riple sections, the vertical sheeting of 2″ x 8″ x 14′ and then load this and the necessary pole pilings onto the dragline barge to complete one structure. All materials were handled by the dragline. While the dragline was being towed to the dam site the laborers were taken by outboard boat to location to begin clearing brush and other obstacles and to stake the exact location of the dam, under the supervision of the assistant project leader. Upon arrival of dragline, all materials were taken from the barge and deposited in equated amounts on both sides of the bayou. Subsequently, pilings were driven for this particular structure. After this phase of the operation the installation of horizontal upper and lower walers were completed. The third step of the operation requires a falling tide for completion. The driving of the vertical sheeting can only be accomplished when water is falling from the inside toward the outside of the structure.

Such a phenomenon, falling tide, holds the sheeting flush against the back side of the horizontal walers. Conversely, if the tide is rising the vertical sheeting is pushed away from the walers and cannot be driven straight and tight. This one condition governs the length of time needed to complete a structure. If tides rise all day and fall at night, then it becomes necessary to shift operations to another locale. By moving to another location it is possible to drive pole pilings and install horizontal walers. Then when tidal conditions have improved the barge returns to the original site. By starting construction in the center of a bayou and completing work toward one bank and then shifting from center toward the opposite bank, the operation can then proceed without abatement, as tidal movements do not now present a problem. The lateral extension into the bank can now proceed swiftly.

Water depth in excess of 16 inches over the pre-set height of the structure does not present a hindrance to installation if water clarity is prevalent and tides are at ebb flow.

After completion of the structure a 3½ foot protuberance of 2″ x 8″ lumber is attached perpendicular 10″ below the top of the dam from bank to bank to serve as an "apron" or splash rail. Such a device prevents the outfall of water from washing a hole or undermining the outside of the structure. As the water on the inside always remains at a fixed minimum, no attachments such as this is needed there.

When the dam is thus completed the dragline is used to backfill and levee the laterals. The laborers are sent back to camp to complete the building of enough materials for completion of another structure. Then the operation is repeated.

In certain portions of the area it has become a necessity to reconstruct the deteriorated spoil levees created by oil and gas companies in their past endeavor of exploration and development practices.

Without constant vigilance and restoration and maintenance, the function of wooden structures would be defeated by allowing loss of waters by marsh buggies and seismographic operations.

Vegetative types on the Wisner tract consist almost exclusively of the climax species of oyster grass. Controlled burning in some instances will revert this climax back to the sub-climax of leafy three-square and Olney three-quarter. Submerged aquatics consist of widgeon grass almost exclusively.

Each year a new segment of the marsh is designated for development through the use of aerial photographs. After determination of the acreage to be developed by use of aerial photos, an on-site inspection is used to determine depths and widths of bayous, ditches, and lagoons to be closed. Then soil borings are made across these same openings to ascertain suitable soil type and texture and also whether or not shells or old stumps would negate installation of wooden pilings. If such conditions are encountered then a

Small hand structure used in closing a trenasse.

Wooden structure of low tide.

new location is plotted and procedures repeated.

After field inspections are complete and deemed satisfactory, then tabulations of materials, cost, and personnel needed are computed and documented for final approval. Detailed work plans are also submitted with respect to approximate man days needed, construction, and procedures to be followed.

All developments are scheduled to be done on the Wisner tract during the winter and spring months. This is necessary due to the area being conducive to inside movements of dragline and barge without having to go into open water of large lakes during winter "northers" such as it is necessary on the Biloxi Public Shooting Grounds. Such a condition permits the working in six month segments on each area and during conducive weather conditions on both.

By courtesy of the Lafourche Parish Police Jury, three shelled boat launching areas were installed and maintained adjacent to the area. The first site is located on the west side of Hwy. 1, near Bayou Moreau, about seven miles south of Leeville. The second launching area is located on the south side of the same highway at Dos Gris, Louisiana, about 15 miles south of Leeville. The third public launching area is located on the north side of Hwy. 1, adjacent to Bayou Fer Blanc. In addition to these three sites an additional one acre parking and launching site has been surveyed and has been offered for approval under the ARA Program.

BILOXI MARSHLANDS PUBLIC SHOOTING GROUNDS

Project W-33-D

This area comprising 40,000 acres of good waterfowl area along coastal Louisiana, was acquired October 1, 1958.

The marsh area lies approximately 30 miles southeast of New Orleans in St. Bernard Parish. The tract is bounded on the north by Lake Borgne, on the east by a zig-zag line starting from Lake Borgne, approximately half a mile east of Bayou Hasouse and running south to the north side of Bayou Loutre, a quarter mile east of Engineer's Canal, thence along Bayou Loutre to a point three-quarters of a mile north of Isaac's Ditch, thence east to a point one and one-half mile northwest of Crooked Bayou, thenc north through Lake Eugenie and Bob's Lak west through Lakes of Bayou Marron, and thenc northeast to Lake Borgne and terminating at point approximately one-quarter mile south Bayou LaFee.

This public shooting ground is accessible fro almost any direction. Access points are as clos as Shell Beach, Yscloskey and Hopedale. Larg er boats take the more direct route south acros Lake Borgne from Chef Menteur and Rigolet

The interior marsh is a labyrinth of bayou lagoons, ditches and ponds. Nearly every pon and lagoon has an abundance of aquatics, such a widgeon grass, southern naiid, and coontai Diving ducks and puddle ducks (scaup, ma lards, teal, gadwalls, and baldpate) come int the myriad of ponds to feed. Upon the shore and marsh proper come thousands of blue an snow geese to feed upon the new shoots of thre cornered grass following burning procedures.

Isolated ridges which now lie dormant stan as mute testimony of the old distributary of th Mississippi River, Bayou Loutre. Upon thes ridges rabbit, deer and the ever present cotto mouth occur.

Salt water fishes such as speckeled trout, re fish, sheephead, etc. are abundant in the water of this area as are freshwater fishes such as re ear and bluegill sunfish and some black bass. Th area is heavily utilized by sport fisherme throughout the year. Particular emphasis is no placed on fishing around the recently complete structures. Successes have been phenomenal o all species of salt water fish.

Actual physical developments commenced i January of 1960. A total of 18 wooden structure were installed during the prior biennium. In ad dition two small manually installed structure were erected. These installations now gover 5500 acres of controlled development.

Installing vertical sheeting on wooden structure.

Earthen fills coupled with wooden structures will tend to stabilize water levels throughout the whole of the developed area. Stabilized water evels should insure the annual production of submerged aquatics such as widgeon grass. Also, tabilized water levels will provide better access during winter months when northwest winds usually blow practically all the water from ponds and lagoons.

Hurricanes off the Louisiana coast during 1962 and 1963 resulted only in delays of operaions as it was necessary to move personnel and equipment to safe harbors for the duration of the hurricane warning.

No physical damage was incurred on either the Biloxi or Wisner area during the storm.

Controlled burning of the marsh will reduce he climax vegetation of wire grass, the big cord grass, and oyster grass. Growths of sub-climax vegetation of three-cornered grass and leafy hree-square, which are favored by geese and muskrats, should result.

The waterfowl seasons saw development operaions well under way and more hunters and fishermen taking advantage of the hunting and fishing opportunities with undeniable proof of successes.

No restrictive measures such as daily permits, number of hunters, etc., are required as prerequisites to hunting or fishing on either the Bioxi or Wisner Public Shooting Grounds.

BOHEMIA SPILLWAY PUBLIC SHOOTING GROUNDS

A biological reconnaissance has been conducted and recommendations and suggestions submitted regarding this potential public shooting ground. A total of approximately 33,000 acres, located in Plaquemines Parish on the east side of the Mississippi River between Bohemia and Ostrica are involved. The Louisiana Wild Life and Fisheries Commission has taken under advisement this offer from the Orleans Levee Board.

Potential for deer, rabbit and rail hunting is excellent on portions of this area. Diving ducks n the large bays and lagoons and dabbling ducks n the interior marsh would provide a boon to hunters.

Although these public shooting grounds are serving the purpose for which they were designed, hey are only stop-gaps as both the Biloxi and Wisner areas are on a lease basis. There could come a day when these leases could be cancelled or not renewed. These are finite and valid conditions to stimulate and achieve the realistic goal of purchasing areas to be used as public shooting grounds. Only by purchase, ownership and rigid regulatory stipulations on oil and gas explorations and development can the hunting and fishing conditions be perpetuated in the Lousiana marshlands.

ROBERT MURRY
Research Leader

Wildlife Research

In the game research program we have just completed an interesting and informative two years. We have seen dramatic proof of the value of sound game management information. In several recent controversial issues the sportsman has been favored with administrative decisions to liberalize harvest regulations. These liberalizations will provide for more recreation without danger of over harvest. Changes were brought about by the orderly planning of research projects, the gathering of pertinent data, the analysis of these data and publication of the results.

In one case a great deal of news media coverage was devoted to the successful fight Louisiana and other interested Mississippi Flyway states waged against the policy of highly restrictive waterfowl regulations offered by the Fish and Wildlife Service. Without the well documented evidence gathered under the waterfowl study the task of demonstrating the need for less severe regulations would have been impossible.

For years Louisiana invested game funds in a cooperative dove research project. While these investments were relatively modest the return was not readily apparent. The group of southeastern states attained the overall project objectives after several years of work. Then armed with the most and the best mourning dove information available at that time they were in a position to show that we had been failing to utilize this resource to the degree we should have used it. Because of that cooperative project, and other single projects in Louisiana and other states, we now enjoy a three-way-split, a seventy-day season, and a daily bag limit of ten birds. This is quite an increase in recreation value from the old thirty-day season and eight-bird-bag that was the case before research lighted the way to utilization more consistent with the potential of the dove resource.

Perhaps of greatest value to Louisiana hunters has been the trend towards better deer management. A number of factors are interwoven to make Louisiana more productive of deer each year. Second growth forest, the deer stocking program, and stepped up enforcement and education have all contributed greatly to our present successful deer management programs. How ever one large factor in the game management area kill has been the liberal regulations.

Although the basic principles of deer management are the same throughout the range and these principles have long been understood by Louisiana's trained game biologists, locally gathered data were essential to management of Louisiana herds. The administrator has more confidence in the trained evaluation of information as it relates to game management area deer than was the case a few years age. The hunter, whose complaints or praise greatly influence the administrator has, in most instances, gleefully accepted the principle of liberal deer harvest.

We feel that we are getting pretty close to sustained yield deer management on game management areas. On some the removal has been cautiously low, on others failure to have a realistic harvest for one or more years may cause the harvest in a single season to exceed the annual replacement rate. This cannot be avoided until we are able to avoid the closing or drastic restriction of game management area seasons periodically.

While we have always been at work trying to better deer hunting outside game management areas we have been unable to produce the high level kill that we get on these areas. We know the differences although we do not know the exact value of each. On management areas we do a little better job of protecting from poaching, we have good protection from year-around dogging and because of these two we need, and have been able to set, either sex seasons. We are eager to be given these three tools of management, statewide. Thus armed we can provide our deer hunters with a legal kill up to ten times as large as it presently is.

The Research Section began use of a research advisory board in 1962. This board is composed of U. S. Forest Service research personnel, Forestry Commission personnel, a wildlife Federation representative, Faculty members of game departments of Louisiana schools, the Cooperative Wildlife Research Unit Leader, all game research leaders and several Wildlife Commission administrators.

The function of this board is to review current work and to assist in planning new work.

CROP DEPREDATIONS BY WILDLIFE

Game birds and mammals as well as other forms of wildlife have been known to cause extensive damage to agricultural crops. In Louisiana expanding deer herds are causing much concern with watermelon, cantaloupe, and truck crops in portions of the state. Many complaint are received by the Commission each year bu the damages seem to increase with summe drouth such as was experienced in 1963.

While it is the policy of the Commission t control game populations by sport huntin wherever possible, several instances of deer damage to high value crops were noted where onl moderate deer populations occurred. These wer usually due to deer seeking the succulent ne growth of melons or truck crops grown on wel fertilized soil. In these cases the planters coul have shrugged of the losses if the deer had consumed the whole plant when they started on one Instead the deer often developed the expensiv habit of sampling all over the field. They woul damage much more than they consumed.

Through the spring of 1963 the Research Section was called in to assist in several problen areas. Field testing of explosive frightening devices was begun in May of 1963. A booby tra device, which is actuated by the deer, has bee found to be effective during field tests in Maryland. Several fields were rigged with device made from agricultural fireworks and importe party novelty booby traps.

During a search for additional explosives i was learned that in 1962 all class C firework had been made illegal by legislative act. The devices were removed and destroyed.

Since favorable reports of the booby tra caused these devices to appear to be a partia answer to some of our deer damage problems w had initiated no other work. Our next logica step is to test commercial deer repellent chemicals under Louisiana conditions. This is bein done during the winter 1963-64 using wheat an oat patches on game management areas as testing sites.

We hope to be able to supply Louisiana farmer with information relative to the advantages an disadvantages of deer repellents as well as information on techniques and the cost of obtaining protection.

Since it is already apparent that the boob traps are much cheaper than the available commercial repellents we need legislative approval t test their effectiveness. If testing after such approval indicated that the usefulness of suc devices outweighed the danger inherent to handling fireworks, agricultural interest could request a legislative change.

To date our depredation relief study has concerned itself only with deer.

TURKEY

It is impossible to divorce turkey researc from turkey development in Louisiana at thi time. We have long needed a flock of wild bird from which we could trap turkey to stock unoccupied ranges.

Birds that descended from game farm birds have persisted for eleven years on three areas of Louisiana without yet producing a huntable surplus. Some of these birds are available for stocking unoccupied range. We have questioned the ability of these birds to produce a large annual huntable surplus.

Turkey research has been aimed at testing the progeny of these birds in competition with native wild birds. For several years our efforts have been hampered by failure to acquire a nucleus flock of native birds.

During the spring of 1963 nine hens and four toms of native stock were released on the Bodcau Game Management Area in Webster and Bossier Parishes. Another supplemental release is planned for that area for early 1964.

The productivity of the Bodcau turkey will be compared to that of one of the populations which originated from game farm stock. The game farm descendents under study are located on and around the Red Dirt G.M.A. in Natchitoches Parish.

Agricultural type developments for turkey have been made on each area and serious efforts are made to protect them from poaching.

Present plans call for the stocking of several game management areas with wild trapped native birds as soon as the birds become available. Where we are able to establish birds on these management areas we feel that we will also be able to remove a portion of the progeny by trapping for transplanting to still more of our uninhabited ranges.

We are disappointed with the progress shown by the Red Dirt turkey after several years of protection and range development. These birds will not be used for stocking other ranges in the foreseeable future.

RABBIT

TESTING TECHNIQUES FOR ESTIMATING RABBIT POPULATIONS

Bait trapping rabbits with box or cage type live traps has been successfully used in Louisiana to mark rabbits prior to hunting season recovery. Trapping and marking by this method alone fails to provide a marked sample which is useful as a population estimator when this same method is used to sample the ratio of marked animals to unmarked animals in a population. One important bias bait trapping exhibits is the tendency of some individuals to become trap prone. This condition led to an individual being captured 57 times in several bait traps during a span of slightly over one year.

We have long realized a need for a trapping technique which would allow the marking of rabbits without creating an unfavorable trap response. We have also been aware of the need of a technique by which we could make total counts of the rabbits on large areas of diverse habitat.

This job has provided valuable information toward the attainment of each of these objectives. We have been encouraged by the results and are anxious to continue this with some modifications suggested by the initial study.

This work was done by John Haygood, District Supervisor of District I. The study area was the Idlewild Agriculture Experiment Station in East Feliciana Parish.

It was found that a 1″ mesh poultry netting, 24 inches tall, securely pinned to the ground was sufficient to contain rabbits. Unbaited traps were set along the inside of one acre enclosures. Rabbits and other small mammals were trapped when they entered the traps seeking a route to the outside of the plot. Sixteen sample acres were trapped with 12 traps each and only slightly more than one-half of the rabbits were captured. The total population of each plot was determined by driving after three days exposure to the traps.

It occurs to us that the sample size of one acre may contain the whole range of a single rabbit within the fenced boundary, thus, undisturbed, such a rabbit would have no occasion to seek an exit from the sample plot. Another possibility is that the 12 traps per plot were too few to adequately sample the plots.

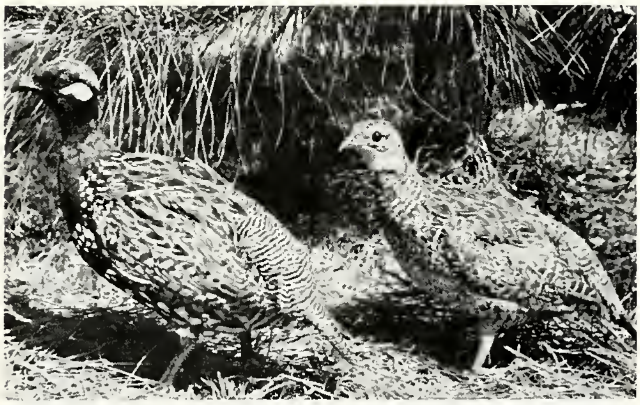
Future trials will involve smaller plots, more traps and possibly netting wings extending out into the plot from the traps.

Opossums, armadillos, and skunks were readily captured by this experimental technique.

BLACK FRANCOLIN

Black francolin liberation results have been discussed by Supervisors of Districts II and V.

Planned research on the release areas has fallen far short of our needs to correctly evaluate these efforts to establish the black francolin in Louisiana. From observations made by Commission personnel the birds appear to have done



Pair of Black Francolins on Morehouse parish release site. Thus far the birds have shown much hope of establishment in Louisiana. Birds are larger than our native Bob-whites.

well. These conclusions are substantiated by area residents who observe birds or broods from time to time.

One need we have is to check out each report of birds spreading into adjacent areas. Trained personnel should be available to study the seasonal use of different cover types by francolin. Our future liberation plans should hinge largely on as thorough as possible a knowledge of the birds' requirements.

Work is needed on trapping techniques so that we can mark birds for population studies as well as trap birds eventually for stocking additional areas. The calling habit of the cock bird strongly suggests the use of a census-call-route technique for inventorying breeding birds. Research is needed to reveal the relationship of calling males to total breeding population. The productivity of individual hens should be learned by marking birds prior to intensive field observations throughout a breeding season.

OAK RIDGE BLACK FRANCOLIN RELEASE

Beginning in 1961, the Louisiana Wild Life and Fisheries Commission introduced the Black Francolin in northeastern part of the state near Oak Ridge, Louisiana. This was an effort to add another game bird to the list of those available within the state.

A total of 342 wild trapped birds were released: 152 in 1961 and 190 in 1962. Survival has been good and young birds have been produced each year. This is verified as birds were observed without leg bands, with one band, and two bands.

Bird movement was extended to approximately 10 miles from the original release point. A few individuals have been reported as far as 25 miles but the number of birds moving this far are thought to be few.

General field inspection trips were made as often as the District work load permitted. In 1963, an early morning call count was initiated to provide information on bird concentrations, movement, and for bird censusing. This project will be carried out on a yearly basis.

The progress made by the Black Francolin during the past biennium has been very good and our views are optimistic. Trapping techniques should be devised and initiated in 1964 on a trial type basis.

DEER RANGE RESEARCH

COOPERATIVE DEER RANGE STUDY

For the purpose of better understanding the interrelationships between various levels of deer populations and the range they occupy this Cooperative Deer Range Study was undertaken. It is being carried out by the Louisiana Wild Life

LOUIS BRUNETT
Deer Study Leader

and Fisheries Commission in cooperation with t Southern Forest Experiment Station and the Ki atchie National Forest of the United Stat Forest Service, and the Soil Conservation Servic The overall planning and establishment of t study was a joint endeavor of the Louisiana Wi Life and Fisheries Commission and the Ale andria Research Center, Southern Forest E periment Station.

Each cooperator is responsible for specif segments of the study. The Southern Forest E periment Station is responsible for the veget tive phase while the Louisiana Wild Life an Fisheries Commission is accountable for mai taining the proper number of deer in each e closure, the biology of the study animals, an maintenance of the fences. The Kisatchie N tional Forest furnished the study area and pr vides management of the timber. The Soil Co servation Service has assisted in making certai soil measurements and gives advice pertaining the soil.

The area selected for installation of the stud is typical of the loblolly-shortleaf pine-hardwoo forest type. In that particular forest type Lo isiana has approximately 4,012,000 acres in ce tral, north, and northwest Louisiana. Practicall all of this type is owned by the United State Forest Service and large landowners. Most of is open to public hunting.

The study is designed to study static popul tions of deer in enclosures at the stocking lev of one animal per 20, 40, and 80 acres. Thre deer enclosures, each 160 acres in size, we constructed for the study. A 20 acre enclosur without deer, was paired with each enclosure fo a control. Static deer populations are maintaine by using only female deer in the stocking.

The overall object of this study is to ga a better understanding between deer and the range in the loblolly-shortleaf pine-hardwood fo est of Louisiana and the carrying capacity o this forest type. Specifically this study has th following objectives under three different stoc ing rates:

1. To determine the availability of forage and he species preference by deer during the sumner and winter seasons.

2. To determine forage "indicator" species that vould serve as management guides in determining pproximate deer stocking levels per unit of area nd in regulating proper range use.

3. To determine the effects of different intenities of deer stocking and forage use upon the ondition and trend of the range and forest reroduction.

4. To determine the production of oak mast and ts influence upon forage use and deer condition.

5. To determine the physical response of deer o range conditions that prevail under three diferent levels of stocking and the prescribed forst management practices.

The study area was selected and a survey arty located the fence line of each enclosure and xclosure by survey. A bulldozer was used to lear the fence right-of-way and excavate a pond, pproximately one-quarter acre in size, in each nclosure. A nine foot deer proof fence was comleted in January, 1961.

The enclosures were stocked with trapped deer t the rates of two deer per one 160 acre enclore, four deer per one 160 acre enclosure, and ight deer per one 160 acre enclosure.

Personnel of the Alexandria Research Center, outhern Forest Experiment Station, put in he study plots and transects necessary to ccomplish the objectives. The plots put in were imber inventory plots and forage production and tilization plots. The transects were established to etermine range condition and trend. Mast traps vere erected to collect acorns for production tudies.

All necessary data have been collected to this ate. So far no conclusions have been drawn.

The end results of this study are expected to ave considerable effect upon future deer managenent in this important timber type of Louisiana. knowledge of the productivity of the particular ange, as well as an understanding of the signs hich indicate the degree of stocking, both ust precede the setting of intelligent harvest egulations.

RANGE SURVEYS

With the rapid increase of the deer herds in he State, it is important to inspect and keep ecords of all information on the ranges that the erds occupy. This information would indicate he condition of the range and aid in the seting of the deer season for that area. The invenories are conducted by trained personnel.

Before an area is inventoried or surveyed the nvestigator checks previous survey reports and ield notes. This gives him an idea as to how the revious survey was made, what was found, and dditional information that he must look for on his survey. The investigator obtains a map of the area and studies it thoroughly as to road network and streams. A survey route is then planned.

The surveys are made by the investigator going into the area, and as he travels (by vehicle or boat) making stops and walking perpendicular to the line of travel. Stops are made as often as deemed necessary by the investigator. At each stop notes are made of occurrence and use of browse and sign such as tracks, droppings, livestock, and dogs.

Local people are contacted as well as enforcement agents, Forestry Commission employees, and industrial foresters for information concerning description of area, factors adversely affecting deer, factors that affect hunting and the economic liability of deer in area.

A narrative report is prepared on each area surveyed. The report includes description of area as to location, physical boundaries, timber types of approximate per cent of each; history of deer herd and hunting seasons; factors adversely affecting deer; factors that affect hunting; condition of range; condition of herd (if determined); economic liability of deer in area; recommendations for coming season; the chances of getting the herds managed along sound biological principles; and an estimate of needs to facilitate deer management in the area.

All the deer range survey reports are forwarded to the Fish and Game Division office where the information is available for use in the setting of deer hunting regulations.

Herbicides and Deer Range

Herbicides are playing an important part in hardwood control in pine forest management. Some of the herbicides are applied by aerial spray or the mist blower. The effects of the herbicide (2, 4, 5T) on deer browse plants was largely unknown.

A study was begun that involved visiting areas that land companies had treated with herbicides applied by either of the two methods

Proper method of tagging deer under Louisiana's Big Game license regulations. The month and date must be punched out on each tag used.

mentioned above for hardwood and brush control. The lands of four companies were visited. The areas were visited in October of 1961 with a follow-up trip in October, 1962. The areas visited were in the northeast (Union and Ouachita Parishes), central (Winn Parish), west (Sabine Parish), and south-central (Allen Parish), Louisiana. Most of the treatment was to kill or control hardwoods and brush so pine could be established.

It was found that the amount of 2, 4, 5T used and the amount of total solution varies from one land company to another and that one company may use various amounts. The amounts used was 1, 1½, and 2 pounds of (2, 4, 5T) Acid in total solutions that varied from 2, 3, 4, and 5 gallons. All chemical used was four pounds acid equivalent per gallon. Diesel oil and water were used as carriers.

It was found that the pine forest manager may use the herbicide as a tool to establish pine in one of two methods. The first method is to apply the herbicide to the brush or hardwoods thereby releasing the established pine reproduction. The second method is to apply the herbicide and direct seed the area to pine the following winter or let it seed naturally from seed trees.

It appears, from field observations, that herbicidies applied from the air or by the mist blower help the deer range. This benefit is in the form of browse production and not in the mast yield. The overhead canopy is opened up allowing sunlight to get to the browse species which stimulates sprout growth that is within easy reach of deer. However, these sprouts may eventually grow out of reach of deer.

Desirable browse species such as yaupon, redbay, sweetbay, deciduous holly, blackgum, the viburnums and smilaxs appear to be resistant to the herbicide. Those species may have crown kill but will sprout at the root collar. Those sprouts grow luxuriantly and provide high quality deer browse.

It appears that if pine seedlings are established and the herbicide is applied to the brush and hardwood the released pine will grow at a rapid rate. The sprouts of the treated brush will grow with or just below the pine. Giving the pine a head start on the brush is what the pine forest manager is after.

If the brush and hardwoods are treated first and the area is seeded later, directly or naturally, it appears that on some sites the brush sprouts will get ahead of the pine. The dense growth of the sprouts will retard the growth of the pine or compete so that the pine will die. Either method may cause a dense growth of blackberry briars that will compete with young pine seedlings to such an extent that the pine may be killed.

Cutting down on the production of mast seems to be the concern of wildlife managers. Some o the oaks will have crown kill but will recover This recovery is in the form of many smal branches coming out along the trunk and large branches. This new growth may produce acorn in a few years; however, this remains to be seen

For the remainder of the year following treatment the woody plants that are browsed by deer may be dead and therefore not utilized This will depend on the amount of herbicide that comes in contact with the plant. The main stem of the plants may be killed. The following spring sprouts will be put out at the root collar

Introduction of Desirable Understory Plants to Commercial Forest

Large landowners are planting vast acreage mostly in cutover pine land, to pine. Some of the landowners and timber managers are interested in producing deer browse, but at the same time, produce the maximum of commercial timber. A study was designed to gather information and to demonstrate the effects planted pine and deer browse species have on each other. The objective of this study is to determine if deer browse plants can be introduced into pine forests and if competition will exist between browse plants and the pine and at what stocking rate competition occurs.

The fruit of various deer browse species was collected to conduct a germination test on their seed. Fruits collected were whitebay, redbay, arrowwood, possumhaw, largeleaf gallberry, strawberry bush, and rattan. Germination tests included planting the whole fruit and removing the seed from the fruit. The germination tests are still being conducted on these species.

Study plots will be established with pine and deer browse plant seed at various seeding rates to try to accomplish the objectives of this study.

DEER INVESTIGATIONS
HERD STUDIES

Deer hunting is gaining in popularity each year. At the same time the progress of modern man is rapidly claiming more and more woodland acreage. Future deer hunting will require us to employ all of the technical skill that we can muster to efficiently manage our deer herds here in Louisiana. This information cannot be obtained quickly, but by initiating a long range research program we will gradually build a background of biological data that will enable us to derive the maximum benefit from our deer herds. At the present time we are conducting several studies that annually produce data that strengthens our knowledge and understanding of the biology of the white-tailed deer. These studies include investigations on food habits, reproduction, general body condition, parasites, disease, and the use of tranquilizing agents in capturing and

DAN DENNETT
Deer Study Leader

andling deer. These studies are only rudiments f a program that is designed to ultimately rovide the deer. Unless we implement a deer ianagement plan based on biological facts we ill never realize the tremendous potential that iis valuable resource offers.

THE DEER REPRODUCTION STUDY

For the past five years the reproductive tracts rom female white-tailed deer have been collected nd examined. During this period, a total of 510 eproductive tracts have been processed. Each reroductive tract was methodically dissected and detailed examination was made. Each ovary as sliced into wafer-like sections approximately millimeter in thickness and each of these secons was examined for corpora lutea and corpora lbicantia. These structures are indicative of the va production during the breeding season. The pproximate ovulation incidence for both the curent season and the immediate past season can e determined by the examination of these strucures. All embryos and fetuses found during these xaminations were measured for age determinaon. This enabled us to ascertain the peak of reeding and fawning season for our various eer herds.

Also incorporated into this study was the comutation of reproduction rates expressed in terms f fawns per adult doe as they occurred in ame Management Area kill records.

RUMEN CONTENT ANALYSIS

This study is designed to give us a detailed ccount of the seasonal food habits of the whiteailed deer in Louisiana. By microscopic examinaion of the food particles found in the rumen stomach), correct identification of the various ypes of plant material utilized by the deer can e made. This technique of analysis will enable s to positively identify food materials that preiously could not be recognized by other means. Ve will now be in a position to identify even the mallest fragments of plant material found in he rumen of deer, thus allowing us to make a etailed stomach analysis. This study is deigned to run for several years so that as many stomachs as possible can be examined.

Since this study in its present form has only recently been initiated, no report on the small amount of data thus far obtained has been written. All future work done on this study will be done in cooperation with the Louisiana Cooperative Wildlife Research Unit at Louisiana State University.

THE TRANQUILIZER STUDY

Wildlife research personnel are continually screening the many developments that modern technology has produced to see if any have an application in the field of wildlife management. The investigation of tranquilizing compounds is an example of such an effort. Since one of the tasks that wildlife workers are frequently faced with is the capturing, handling, and transportation of certain species of wildlife, tranquilizing agents are being tested to determine whether or not their use will increase the efficiency of such operations. Although tranquilizers were tested initially in search of a means of reducing mortality resulting from trapping and handling certain game animals and birds, it now appears that wild animals can also be captured by mixing powered tranquilizer with bait substances.

Louisiana has been a pioneer in this field of work and has attracted widespread attention. A technical paper entitled "*A Preliminary Report on the Use of Tranquilizing Compounds in Capturing and Handling Wildlife*" authored by Robert E. Murry, Research Project Leader and the deer study leader was presented at the Seventeenth Annual Conference of the Southeastern Association of Game and Fish Commissioners at Hot Springs, Arkansas in September, 1963. This paper has stimulated much interest and many states have expressed a desire to enter this extremely promising area of research.

Our initial studies of tranquilizing agents have been centered primarily around although a limited amount of work involved turkey, foxes, nutria and squirrels. Preliminary testing of several tranquilizing agents has resulted in the selection of a compound that has all of the characteristics required for use in wild animals. A large drug manufacturing concern has made available to the Commission a quantity of this experimental drug. Since we were primarily interested in evaluating the effects of this agent on deer, a captive deer herd was started. These deer were used as test animals for this new drug. As a result of this testing we now feel that we are thoroughly familiar with the characteristic effects that this agent has on deer. So encouraging were the results of these tests that we feel that this drug can be used with astounding success in preventing mortality resulting from capturing and handling deer as well as being an effective agent for use in capturing wild deer. Recent attempts to catch semi-tame deer from large enclosures have been highly successful. Plans are now being made to capture deer in early 1964 from a large herd of deer in the prairie country of southwest Louisiana.

Although our studies have been devoted primarily to deer in the beginning of this investigation, we believe that game birds, both native and exotic, can be handled more effectively after being tranquilized. These game birds include wild turkey, black francolin, red jungle fowl, black necked pheasant, and the bamboo partridge. It is believed that the foregoing exotic species can be raised in captivity much easier while under the influence of a tranquilizing agent. Attempts will also be made to capture wild turkey with bait treated with tranquilizer.

At this time it is strongly believed by those who have worked with tranquilizing compounds that there are unlimited uses for tranquilizing agents in the field of wildlife management. Our preliminary studies strongly support this belief.

PRELIMINARY PARASITE SURVEY

While this study is in some respects similar to the Southeastern Cooperative Wildlife Disease Study, the objectives of the two studies are quite different. The objective of this study is to survey the parasites occurring in normal healthy deer rather than diseased deer or deer from overpopulated ranges. By becoming familiar with the parasites normally occurring in developing deer herds, or healthy deer, our technicians will be able to notice trends toward heavy parasitism which is indicative of an overpopulated condition. This study is also designed to teach biologists the techniques of post mortem examination as well as the gross anatomy of deer.

Aging deer is part of the biological checks received on Louisiana's Game Management Areas. Deer can only be aged by tooth development and wear.

Although only three deer herds have been examined thus far, it is hoped that within the next year most of the major deer herds of our state can be examined. This study has moved much slower than originally intended due to the lack of a trained parasitologist to identify those parasitic forms encountered. We have received aid from the Southeastern Cooperative Wildlife Disease Study and the Department of Veterinary Science of Louisiana State University, but unfortunately these two agencies have schedules that do not permit them to handle all the material that we collect. The Department of Zoology at Tulane University has expressed an interest in collecting parasites from deer and has generously agreed to work closely with us in this investigation. Therefore, we are now in a position to survey deer parasites at a much faster pace than was previously possible. We are hopeful that a check list of the common parasites of the white-tailed deer in Louisiana will be forthcoming in the near future as a result of this study.

THE GENERAL CONDITION STUDY

This study maintains an annual check on the physical condition of the deer killed on our game management areas. The data obtained from this investigation keeps us informed as to how efficiently we are managing the deer herds on the various areas throughout the state. These data include ages, sex, weights and antler measurements. This information is compared with previous data from the respective area. In this manner we are able to detect any changes that occur in the different age classes. The keynotes of efficient deer management are weight gain and increased fawn production. When deer are removed from a crowded range, the remaining animals have more food available to them which in turn brings about weight gain and increased fawn production. Annual fluctuations in average weights and fawn production are indications of the efficiency of our management program. Only through a continuous program of sound management will the hunter harvest the maximum sustained yield of healthy deer. There is no way we know of to achieve sound management of our deer herds without annual either sex harvests. The following tables present the data collected from some game management areas during the last four years. A critical eye can easily spot the effects that adequate harvests have had on the general physical condition of our deer herds.

DEER HERD COMPOSITION DATA

Based On Fawns Per 100 Adult Does (2½ yrs. & up)

Seasons	*Catahoula*			*Chicago Mill*			*Evangeline*			*Jackson-Bienville*			*Red Dirt*			*West Bay*		
	Adult does	*Fawns*	*Ratio*	*Adult does*	*Fawns*	*Ratio*	*Adult does*	*Fawns*	*Ratio*	*Adult does*	*Fawns*	*Ratio*	*Adult does*	*Fawns*	*Ratio*	*Adult does*	*Fawns*	*Ratio*
1958	----	----	----	81	67	83	----	----	----	----	----	----	----	----	----	----	----	----
1959	77	71	92	167	180	108	13	29	223	89	98	110	90	84	93	----	----	----
1960	----	----	----	132	79	60	36	52	144	16	13	81	43	42	98	56	64	114
1961	33	41	124	----	----	----	23	41	178	26	30	115	20	35	175	91	118	130
1962	----	----	----	121	139	115	----	----	----	41	45	110	----	----	----	----	----	----
1963	73	65	89	69	45	65	28	34	121	88	92	104	50	59	118	132	176	134

TABLE OF HUNTER SUCCESS FOR SOME LOUISIANA GAME MANAGEMENT AREAS FOR THE 1962 and 1963 HUNTING SEASONS

	1962				*1963*		
			Hunter Success				*Hunter Success*
Area	*No. Of Hunters*	*No. Of Deer Killed*	*"Bucks Only"*	*"Any Deer"*	*No. Of Hunters*	*No. Of Deer Killed*	*"Any Deer"*
Caldwell G.M.A.	608	42	1/15		1,268	242	1/ 5
Catahoula G.M.A.	1,927	53	1/36		2,688	226	1/12
Chicago Mill G.M.A.	8,357	844		1/10	11,888	1,360	1/ 9
East Carroll G.M.A.	132	3	1/44		1,682	144	1/12
Evangeline G.M.A.	1,218	33	1/37		1,314	99	1/13
Jackson-Bienville G.M.A.	2,142	152		1/14	4,883	325	1/15
Red Dirt G.M.A.	2,054	42	1/49		2,650	250	1/11
Sabine G.M.A.	140	2	1/70		251	21	1/12
Union G.M.A.	145	6	1/24		511	49	1/10
West Bay G.M.A.	5,522	135	1/41		8,072	900	1/ 9
STATE TOTAL	22,245	1,302		1/17	35,207	3,616	1/10

Note: Fort Polk and Zemurray Park data are not listed in these tables.

TABLE OF COMPUTED LIVE WEIGHTS OF DEER KILLED ON SOME LOUISIANA GAME MANAGEMENT AREAS During The 1960, 1961, 1962 and 1953 Controlled Hunts

Age	*Sex*	*Catahoula*					*Chicago Mill+*				*Evangeline*			
		1960	*1961*	*1962*	*1963*		*1960*	*1961*	*1962*	*1963*	*1960*	*1961*	*1962*	*1963*
6 Mo.	Male	....	54.6	....	48.1	....	66.0	....	52.4	63.6	57.2	60	....	55.4
	Female	....	53.4	....	45.7	....	58.2	....	48.4	60.3	52.1	54.6	....	51.9
1½	Male	95.5	97.2	290.8	81.6	....	112.3	129.7	117.1	121.7	94.6	95.8	90.7	95.6
	Female	....	80.8	....	70.6	91.5	....	99.6	96.8	79.4	79.4	79.1	....	82.7
2½	Male	114.2	118.0	123.4	106.6	155.9	154.5	160.3	155.0	102.1	102.1	106.6	117.3	113.8
	Female	....	84.2	....	75.0	....	110.5	....	104.6	119.4	82.4	87.2	....	93.8
3½	Male	135.6	138.4	133.3	117.8	....	188.5	174.1	192.8	178.2	109.5	117.6	135.4	125.0
	Female	....	101.9	....	85.3	....	115.5	....	110.0	124.8	86.6	93.3	....	97.8
4½	Male	128.3	154.7	0	125.2	....	203.0	216.2	223.6	220.1	141.5	155.1	138	....
	Female	....	87.6	....	85.5	....	119.9	....	110.2	117.1	96.9	91.5	....	97.7
5½	Male	139.2	139.6	145.0	....	....	195.6	225.0	198.8	197.7	131.4	154.8	143.8	....
	Female	....	101.6	....	90.6	....	112.4	....	114.6	122.4	116.0	92.6	96.0	91.6

Age	*Sex*	*Jackson-Bienville*				*Red Dirt*				*West Bay*			
		1960	*1961*	*1962*	*1963*	*1960*	*1961*	*1962*	*1963*	*1960*	*1961*	*1962*	*1963*
6 Mo.	Male	58.4	55.3	44.9	49.3	59.7	55.3	....	43.1	50	43.9	....	53.5
	Female	49.9	54.9	42.1	48.4	53.2	50.6	....	41	46	45.3	....	46.8
1½	Male	120.5	111.6	100.8	108.5	93.0	95.8	96.4	80.5	80.3	84	287.1	81.3
	Female	91.6	100.8	84.6	87.5	83.7	78.0	....	73.2	73.6	71.7	....	77.1
2½	Male	158.8	158.0	124.6	136.9	121.6	120.6	118.4	107.9	97.5	102.0	102.5	94.8
	Female	112.5	113.9	92.2	101.3	86.6	84.6	....	82.2	74.6	76.0	....	81.1
3½	Male	175.8	176.0	167.2	178.2	119.9	135.9	135.4	127.5	105.4	114.8	109.7	111.8
	Female	123.8	116.4	95.3	108.4	93.9	83.6	....	81.5	91.1	83.4	....	84.9
4½	Male	....	208.0	192.2	201.3	137.0	134.2	140.0	131.8	103.6	127.8	125.1	108.3
	Female	114.0	121.1	99.2	112.8	93.2	92.9	....	88.5	84.0	81.2	....	84.3
5½	Male	225.0	203.8	141.0	....	147.1	135.4	....	127.1	116.7	139.6	124.6	94.0
	Female	82.0	116.0	96.5	109.3	91.9	100.3	....	84.0	87.5	82.4	....	87.8

NOTE: Data for 1960 and 1961 Are corrections for a similar table which appeared on page 89 of NINTH BIENNIAL REPORT.

MOURNING DOVE INVESTIGATIONS

LARRY SOILEAU
Dove Study Leader

During the past two years the major efforts of the dove study have been directed toward gathering management data in an effort to realistically harvest the mourning dove. In order to determine the status of the dove population, two census methods were employed. These were the random road count, a count of all doves seen by biologists during year-round daylight driving throughout the state, and the call count, a nationwide count of cooing doves along permanent routes censused once annually between May 20 and June 10. While these census methods do not reflect total population, they do provide an index which may be compared with the previous year's index to determine a trend in the population. The indexes obtained indicate a substantial increase in the 1963 statewide dove population. The average statewide 1963 May-June random road count indicates a 23.1% increase from the 1962 level at that time. The call count survey indicates a 36.4% increase in the number of doves heard from the 1962 level. For the United States as a whole, however, the 1963 breeding population remained at the same level as the previous year's.

The call-count survey provides the only national population index presently available, but it has important limitations. It is an index to the breeding population only and does not serve as an indicator of production. Since a large portion of the fall population consists of young of the year, this is an important limitation. A reliable census technique for determining the status of the dove population is presently one of the most pressing needs in the overall dove management program.

Dove management for the past decade has been characterized by a gradual relaxation of hunting regulations. The call-count survey has revealed that the overall dove has generally increased despite these more liberal regulations. For the first time, Louisiana was allowed to select a hunting season of three segments in 1962. This type of season was again selected in 1963. The 3-way split season has served to satisfy the demands of hunters in different sections of the state, each group wishing to hunt when birds are locally most abundant. A hunting season of three segments has long been needed in this state and has been enthustically received by dove hunters.

TELEPHONE SURVEY

The attention of dove researchers has recently been turned to the development of a technique of reliably measuring dove harvest. During the 1960-61 hunting season, the telephone interview as a means of obtaining dove kill information was investigated in Acadia Parish. Armed with the information gathered during this pilot study and statistical advice from the Institute of Statistics, North Carolina State University, a statewide telephone survey was inaugurated this year in an effort to obtain an index to dove kill. A selection of 45,000 telephone numbers was drawn at random from the total of 672,000 residential subscribers in the state. One-third of these subscribers was contacted at the close of each of the first two segments of the hunting season and information concerning kill and hunting trips was obtained. Cooperation thus far has been excellent. Telephone interviews for the last segment will begin at the end of the hunting season on January 7, 1964.

Preliminary analysis of data gathered thus far indicate that, of that portion of the state's population who live in a household having a telephone, 54,000 are dove hunters. These hunters killed an estimated 337,500 doves during 126,400 hunting trips during the first segment of the season, September 2-16. These estimates do not include dove hunters who live in a household without a telephone and, therefore, represent a

Charles "Chili" Baur, Biological Aid, Fish and Game Division recording technical data for a trapped and banded mourning dove. Louisiana has been one of the nation's leaders in dove research.

inimum number of dove hunters, kill and trips or the state.

This survey will be continued during future ears and the estimates obtained compared in an ffort to evaluate the effects of changes in huntng regulations on kill, one year's harvest on the ollowing year's harvest, and the value of the all-count breeding population estimate as a prelictor of fall kill. This pioneer telephone survey s being closely watched by other Southeastern tates and may soon be in use throughout the Eastern Dove Management Unit.

In a continued effort to better understand miration and mortality, dove trapping and bandng was conducted at trapping stations near Monroe and Alexandria. During the past two ears a total of 1075 doves has been banded. In ddition to banding, throat swabs of trapped loves were obtained and sent to the Patuxent Wildlife Research Center for analysis as part of he national cooperative dove disease surveillance rogram.

Analysis of throat swabs sent during the sumner of 1962 revealed that 2.7% of the birds ested were positive for *Trichomonas gallinae*, flagellated protozoan causing severe mortality n doves. Infected birds are identified by the resence of a yellow cheese-like mass in the back f the mouth and the foul odor emitted from the hroat. Because of the obstruction of air and ood passages by lesions, the dove loses weight apidly, becomes weak, and finally dies from uffocation or starvation. In its fatal form, the ourse of the disease is rapid with death occuring within 10 days of infection. Trichomoniasis, owever, poses no threat to human health.

Since the disease is transmitted by infected ood or water, the tendency of doves to congreate when feeding or drinking contributes to its pread, especially during periods of high dove opulation. Although the last serious outbreak of he disease occurred in 1950 and 1951, a few ases are reported each year and are kept under areful surveillance.

RABBIT INVESTIGATIONS

JACK O. COLLINS
Rabbit Study Leader

In Louisiana, rabbits rank near the top in ame species after deer, squirrels and waterfowl. The importance of rabbits has increased tremenlously during the past fifteen years. This is espeially true from central Louisiana southward, but he number of rabbit hunting enthusiasts is growng rapidly in north Louisiana. Two species of abbits are found in the state, cottontails and wamp rabbits, both of which are quite common. Because of the shrinking natural range and estricted hunting privileges the need for concentrated studies on both cottontails and swamp rabbits has become apparent. For the proper management and harvest of any game species knowledge of certain basic facts are necessary. Some of these are known, but some factors remain unanswered at this time.

Research is not an overnight process. It must be carefully designed and conducted in order to get worthwhile results. Hence, before certain specific management practices are applied more information is needed.

This report encompasses work carried on between January 1, 1962 and December 31, 1963.

Four main objectives were included in the study as follows: (1) To obtain an index to population trends, (2) to determine trends in rabbit hunting success in various areas of the state, (3) trapping and tagging of swamp rabbits in order to gather information on trapping techniques, to gather data on factors influencing trapping success, to determine cruising radius, seasonal range, longevity of marked animals, and to determine percent carryover from one hunting season to the next, and (4) preliminary investigation of aging rabbits by the lens technique, and to find out the percent harvest of adults as compared to juveniles on specified areas.

RANDOM ROAD COUNTS

Population or activity trends are determined each month of the year in the eight administrative districts of the Pittman-Robertson section, Fish and Game Division. The work is assigned to all biologists of the P-R section. The following method is used to obtain the data which is compiled and analyzed by the study leader at the end of each month.

When traveling to perform routine duties the driver records the number of dead and live rabbits observed. Also, the speedometer reading is recorded at the beginning and completion of each trip. This information is kept only during daylight hours and by day, month, and year. Calculations are made on the basis of the number of rabbits observed for each 100 miles of travel. The annual index figure was 0.63 for the twelve month period, July 1, 1962 through June 30, 1963. During the three preceding study years the average was 0.66, 0.69, and 0.70, respectively.

HUNTING SUCCESS TRENDS

Another phase of the rabbit research program consists primarily of compiling information solicited from rabbit hunters located throughout the state. In 1961, hunters were asked to keep records of their hunts for at least three successive seasons. Information recorded includes the number of rabbits bagged per hunt and the number of people participating in each hunt. Forms are provided for keeping these records along with stamped return address envelopes to be used at the end of the hunting season. This plan was designed only to determine trends in rabbits hunting success in various areas of the state. It is seldom that a group of hunters bag a party limit of rabbits on a single hunt. Usually the average kill per hunter effort is less than two rabbits. The average number of hunters per hunt was 3.3 in 1961 and 3.8 during the hunting season of 1962-63. In the 1961-62 season the number of rabbits bagged per hunt was 3.7; whereas, in 1962-63 the figure was 4.5. The number of rabbits bagged per hunter effort during the 1961-62 season was 1.1. The rabbit kill was slightly higher in 1962-63 than the previous year. The increase was from 1.1 to 1.2.

AGING TECHNIQUE STUDIES

A research job initiated in June, 1962 is entitled "Aging Rabbits by the Lens Technique". It involves classifying rabbits as adults or juveniles according to the weight of the lens. Lenses are removed from eyeballs of rabbits collected during the hunting seasons on specified areas. Upon removal from the rabbit each eyeball is stored in formalin, then at a later date the lens is removed, dried, and weighed. Preliminary investigation of aging rabbits by this technique is underway. Fifty-four swamp rabbits were harvested on the Thistlethwaite Game Management Area during the controlled hunts conducted on the area in 1962. Lenses in apparent good condition were removed from 38 of these. Seven additional sets of lenses taken from swamp rabbits killed outside the management area were used in the experiment. Thirteen of the 38 were in the juvenile category. All seven rabbits collected from outside the management area were adults.

TRAPPING AND TAGGING

A trapping and tagging program was started on the Thistlethwaite Game Management Area, St. Landry Parish, in July, 1962. This job is in its early stages of development. It was primarily designed to experiment with trapping techniques and gather data on factors influencing trapping success. The area consisting of about 10,000 acres is typically bottomland hardwood. It is swamp rabbit habitat; thus, the work is confined to this species almost entirely. Approximately twenty-five different rabbits were caught along with many rats and oppos sums plus some other kinds of animals betwee July 1, 1962 and June 30, 1963. Each rabbi caught was ear tagged and released at trap site

Jack O. Collins, Rabbit Study Leader, is seen abov at work in Commission laboratory on rabbit re search project.

For trapping purposes, about fifty box typ traps were used. In addition some drift fenc trapping was employed in the spring of 1963 Delicious apples were the main kind of bait used but at one time or another, lettuce, celery onions, and/or potatoes were used.

There was considerable emphasis on placemen and location of traps. Trap sites were locate throughout the area, and the traps were frequently relocated. Some preliminary work wa performed on placing traps different distance apart.

A comparison of trapping efforts inside the woods and outside or along the edges of openings was made.

In an effort to determine value of prebaiting during the spring of 1963 some traps were set with bait at time of initial placement, and at a nearby location with like habitat the traps were pre-baited daily until good usage was in evidence. These traps were then set.

Results of the trapping are summarized as follows: 1. Pre-baiting should be conducted as late as possible in the afternoon. Birds and ants were found to be the only day time users of the bait. However, birds were seldom a serious competitor with night feeders. 2. Ants were frequently a serious competitor for the apples. The problem was eliminated, however, by sprinkling a mild insect powder inside and around the edge of each trap. One application served as a deterrant to the ants for several days but did not alter trap success from the standpoint of number of animals caught. 3. Of the several kinds of bait tried, delicious apples proved to be the only effective one. 4. In relation to edges of openings or woods, catch success was best when traps were placed 5 to 20 feet inside woods. In contrast, however, rat competition was more severe further in the woods. 5. On some of the experiments trapping success on rabbits increased considerably after the first trap efforts when most of the wood rats and oppossums were eradicated. 6. For the purpose of handling rabbits a funnel of one inch mesh poultry wire was devised. The total length is about three feet and at the open end it is about a foot in diameter. 7. Weather conditions were an important factor in affecting catch success or failure. Rabbits were most active after periods of warm, light rain. When temperatures were below freezing animal activity was at a minimum and the trap catch of any kind of animals was usually low. 8. Some swamp rabbits were retrapped on most every occasion that the trap was set. They were usually caught in close proximity to or at the original trap site. On the other hand about half the rabbits caught were never retrapped a second time.

The various phases of the trapping and tagging program in its present form will continue for some time to come because of the need for more basic knowledge about rabbit trapping.

With the growing interest in rabbit hunting and the increasing numbers of people desiring new forms of recreation it is hoped that the rabbit research program of the Louisiana Wild Life and Fisheries Commission will be adequate to meet the needs of the people in this state.

SQUIRREL INVESTIGATIONS

J. B. KIDD

Study Leader

In October of 1962 a squirrel research paper entitled "The Development of an Efficient Squirrel Trapping and Marking Technique in Louisiana" was authored by J. B. Kidd and L. D. Soileau, biologists of the Louisiana Wild Life and Fisheries Commission and addressed to the Sixteenth Annual Conference of the Southeastern Association of Game and Fish Commissioners. This paper was the product of several years trapping and marking which began in 1952 and has continued until the present.

TRAPPING AND TAGGING

Prior to the hunting season of 1962, 200 squirrel traps were put in operation on the 10,000 acre Thistlethwaite Game Management Area located north of Opelousas in St. Landry Parish. Four weeks of trapping in May and September resulted in the capture and marking of 375 squirrels. During a 16 day hunting period in October 1962, 147 tagged squirrels were killed by hunters for a 40 percent return. This return information indicated that hunters harvested 40 percent of the total population.

Further analysis of this information revealed an estimated population before the hunt of 14,360 squirrels.

A similar trapping and marking program was conducted in May and September of 1963. A total of 166 squirrels were marked prior to the hunting season in 1963. During the hunting period that followed in October hunters killed 23 percent of the squirrels marked in 1963. This data revealed a 23 percent harvest by hunters in 1963 as compared to a 40 percent kill in 1962. It also determined by tag return analysis that the total population before hunting in 1963 was considerably lower than in 1962. Total population estimates in 1963 were computed to be 9,357 squirrels as compared to 14,360 in 1962. Below the following is a comparison of interesting figures determined from tag return analysis on the Thistlethwaite Game Management Area between the years 1962 and 1963.

TAG RETURN ANALYSIS

	1962	*1963*
Total Pop. Est. Before Hunting ...	14,630	9,357
% Kill of Tot. Pop. By Hunters	40	23
No. Sq. Remaining After Hunting .	8,438	6,961
Total Kill By Managed Hunts	5,932	2,396
Avg. Kill Per Hunt. Effort	2.64	1.50
% Natural Mortality that Occurred Before Hunt	21	43

WATERFOWL

CLARK HOFFPAUIR

Study Leader

The past two years have been perhaps the most important thus far in the maintenance of the sport of duck hunting in the State. But for the efforts of the Louisiana Wild Life and Fisheries Commission the hunting season on ducks would have probably been closed in the Mississippi Flyway. After an all out effort by the Commission and interested sportsmen in Louisiana, the trend of more restrictive hunting regulations was finally reversed in 1963. Never again should Louisiana lower its guard at the time duck hunting regulations are being established in Washington or the State may well see the end of this great traditional outdoor sport. No other move could be made that would more imperil the future of the waterfowl resource than to close or drastically curtail hunting opportunity and thereby end public support for the preservation of waterfowl habitat and management programs.

Aerial censuses of waterfowl were conducted twice monthly from September to April during the past two years. Sometimes weather and conflicting schedules did not permit this program to be strictly adhered to. In 1962-63 the first inventory was conducted on October 29, 1962. At that time approximately 2,636,500 ducks were counted. The peak population was reached at the time of the mid-winter inventory. When a total of 4,523,550 ducks were found in the state.

The census was started again on September 4, 1963 and has been continued twice monthly until the writing of this report during the latter part of November 1963. The largest number of ducks recorded thus far is 4,409,550. This figure is lower than the mid-winter inventory of January 4-7, 1963, but it may be noted that this is approximately 1,000,000 more than during November, 1962.

Mallards are one of the primary waterfowl species found in the Mississippi Flyway. Certainly it is the main yardstick used by the federal authorities in establishing waterfowl hunting seasons. A comparison between censuses of November 14-16, 1962 and November 19-20-21 1963 show a 21.3 per cent increase of this particular species.

Each of the statewide surveys is made by airplane and covers approximately 760 miles linear miles of transects and 1130 miles of total flying. Approximately 10 to 11 hours flying time are required for each flight depending on weather. The total hours actually flown per month approximate 35 hours for the two censuses.

On the 15th of September the Commission purchased a new Cessna 210 to replace the old Cessna 180 which had a total of 1500 hours operation. Another reason for purchasing this new aircraft with retractable landing gear was for safety. Most of the flying is done at 75 feet above ground or water level and an emergency landing with a fixed wheel plane would mean disaster. The new aircraft is a high winged, retractable gear, single engine plane, which would allow a forced landing in the marsh country without too much danger.

Table I

LOUISIANA WATERFOWL INVENTORY—1962-1963

	Oct. 16-17	*Oct. 29- Nov. 1*	*Nov. 14-16*	*Dec. 3-6*	*Jan. 7-10*	*Jan. 24- Feb. 4*	*Feb. 25, 26, 28*
Mallard	3,500	120,000	295,000	450,000	510,200	500,000	290,000
Black Duck	0	2,000	18,000	21,000	13,850	20,000	14,000
Gadwall	85,000	273,000	309,000	328,000	339,950	308,000	303,000
Balpate	196,500	281,000	213,000	197,000	209,600	273,000	213,000
Green W. Teal	82,500	370,000	355,000	442,000	487,600	467,000	411,000
Blue W. Teal	342,000	340,000	292,000	260,000	222,200	310,000	295,000
Shoveler	122,500	271,000	221,000	295,000	248,400	264,000	312,000
Pintail	195,000	423,000	700,000	713,000	652,800	588,000	435,000
Wood Duck	no count	no count	no count	no count	85,000	no count	no count
Mottle Duck	31,000	30,000	33,000	33,000	32,000	33,000	28,000
Redhead	0	500	no count	1,500	9,100	no count	no count
Canvasback	0	0	2,000	4,000	12,000	18,500	24,000
Scaup	Tr	500,000	860,000	1,502,000	1,601,100	4,000	470,000
Ringneck	Tr	20,000	55,000	60.000	72,750	24,000	15,000
Ruddy	0	X	X	X	8,000	2,500	1,000
Merganser	0	6,000	9,000	11,600	19,000	25,000	13,000
TOTAL	1,058,000	2,636,500	3,362,000	4,317,500	4,523,550	2,842,000	2,824,000
Canada G.		5,000	2,000	3,100	7,200	7,275	
Whitefr. G.	1,030	10,050	30,000	35,000	32,150	32,150	
Blue and Snow G.	5,700	176,500	280,000	330,000	386,070	386,070	
TOTAL	6,730	191,550	312,000	368,100	425,420	425,495	
Coots	47,500	345,000	275,000	265,000	376,600	269,000	270,000

Table II

LOUISIANA WATERFOWL INVENTORY—1963-64

	Sept. 20-23	*Oct. 7-9*	*Oct. 21-23*	*Nov. 4-7*	*Nov. 19-21*	*Dec. 2-4*
Mallard	150	330	413	153,400	358,000	669,000
Black Duck	0	0	0	4,850	9,000	9,500
Gadwell	100	10,300	49,700	674,000	942,500	910,800
Baldpate	1,150	90,160	406,800	429,000	336,700	270,300
Green W. Teal	2,000	47,530	123,250	505,000	662,000	899,800
Blue W. Teal	507,280	468,800	533,200	559,500	302,000	547,000
Shoveler	4,516	71,550	159,700	233,700	188,300	341,500
Pintail	14,475	169,900	223,850	796.300	623,100	819,700
Wood Duck	*	*	*	*	*	*
Mottled Duck	44,700	36,500	41,500	43,000	48,900	48,000
Redhead	0	0	0	0	0	0
Canvasback	0	0	0	0	0	400
Scaup	**	**	**	59,000	909,000	773,300
Ringneck	0	0	2,900	25,500	22,300	26,800
Ruddy	0	0	161	500	700	1,350
Merganser	0	0	15	2,800	6,850	22,700
TOTAL	574,371	895,070	1,541,489	3,486,550	4,409,350	5,340,150
Canada G.	**	**	**	2,200	2,200	2,200
Whitefront G.	**	20,000	**	38,750	38,750	38,750
Blue and Snow G.	**	**	**	257,000	257,000	257,000
TOTAL		20,000		297,950	297,950	297,950
Coots	2,050	4,100	17,620	434,000	861,800	857,500

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*No Count **Not Censused

AGE RATIOS OF DUCKS

The age ratios of young per adult has been on an increase since the 1961-62 season. On the Canadian and Alaskan breeding grounds each year a breeding ground survey is conducted to determine the number of nesting pairs and young per adult. A further follow up of this is the hunter bag check conducted by each state in the Mississippi Flyway. This later survey gives some indication of brood survival and also the final age ratio between young and old birds. To be statistically sound, a five per cent sample of the total population should be measured. This is rather impracticable as the number of birds examined would have to be in the neighborhood of 400,000. The main reason for the survey is to establish a trend to show age ratio changes from year to year. The trend has been an increase since 1961-62. It is hoped that this increase of young to old ducks, will continue over the next few years. Ducks are a very adaptable resource of great potential and within certain limits can adapt to adverse climatic factors.

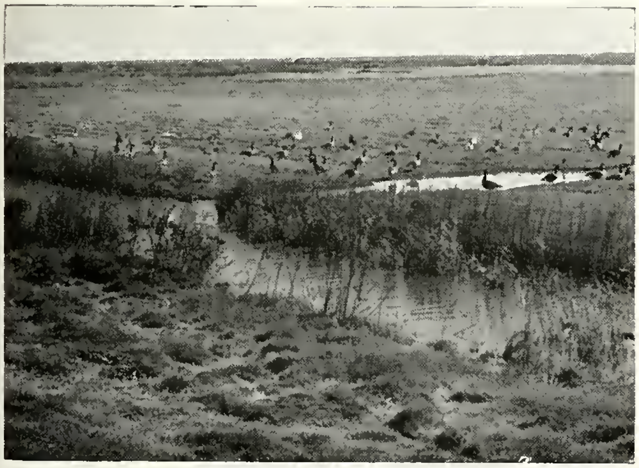
Age Ratio of Puddle Ducks Killed in Louisiana

Season	*Young per adult*
1959-60	.33
1960-61	1.02
1961-62	.56
1962-63	.94

Table III

LOUISIANA DUCK AGE RATIOS BY SPECIES
1962-63 Season (Nov. 30-Dec. 24, 1952)

	Males			*Females*								
Species	*Ad.*	*Imm.*	*No. Imm. Per Ad.*	*Ad.*	*Imm.*	*No. Imm. Per Ad.*	*Total Males*	*Total Females*	*Total Adults*	*Total Imm.*	*No. Imm. Per Ad.*	*Total Ducks*
Mallard	87	63	.72	40	70	1.75	150	110	127	133	1.05	260
Gadwall	8	10	1.25	5	18	3.60	18	23	13	28	2.15	41
Am. Widgeon	16	17	1.06	8	18	2.25	33	26	24	35	1.46	59
G. W. Teal	22	20	.91	8	17	2.13	42	25	30	37	1.23	67
B. W. Teal	22	16	.73	19	22	1.16	38	41	41	38	.93	79
Shoveler	13	24	1.85	6	24	4.00	37	30	19	48	2.53	67
Pintail	101	53	.52	41	41	1.00	154	82	142	94	.66	236
Wood Duck	23	8	.35	6	9	1.50	31	15	29	17	.59	46
Mottled Duck	44	1	.02	7	16	2.29	45	23	51	17	.33	68
SUB TOTAL	336	212	.63	140	235	1.68	548	375	476	447	.94	923
Redhead	...	1	...	...	...	...	1	...	...	1	...	1
Lesser Scaup	1	7	7.00	2	13	6.50	8	15	3	20	6.67	23
Ringneck	7	7	1.00	3	9	3.00	14	12	10	16	1.60	26
Merganser	1	...	...	...	...	...	1	...	1	...	...	1
SUB TOTAL	9	15	1.67	5	22	4.40	24	27	14	37	2.64	51
GRAND TOTAL	345	227	.66	145	257	1.77	572	402	490	484	.99	974



Canadas from Missouri, live-trapped and transported to Louisiana are shown looking over the enclosed marsh area which will be their new home. These are part of 2,000 Canadas trapped in Missouri and trucked to Louisiana in an effort to build up larger flocks. A 2,000-acre area will be fenced to provide nesting room for these Canadas.

WATERFOWL WEIGHTS

Average waterfowl weights have been the objective of many studies. It still remains a fact that waterfowl in Louisiana have never suffered from lack of natural marsh foods or agricultural crop residue. It may be in the future that due to drainage of natural marshes in Louisiana a change in feeding habits will develop.

It is hoped that from waterfowl weight some correlation between age and condition of the marsh will be developed. In other words weights would be an indication of the bird's age; thus supplementing the age ratio studies. It may be added that waterfowl weights in Louisiana are usually above the national average.

Table IV

LOUISIANA WATERFOWL WEIGHTS*
1962-63 Season (Nov. 30-Dec. 24, 1962)

	Pass A Loutre				*Grand Chenier***				*Combined Average*** Weights Pass A Loutre—Grand Chenier*			
Species	*Ma*	*Mi*	*Fa*	*Fi*	*Ma*	*Mi*	*Fa*	*Fi*	*Ma*	*Mi*	*Fa*	*Fi*
Mallard	...	1	...	...	38	21	11	29	...	...	...	...
	...	50.0	...	...	46.2	43.5	40.9	39.7	46.2	43.7	40.9	39.7
Gadwall	3	1	1	3	3	3	1	4	...	...	...	...
	41.3	36.0	38.0	34.0	36.2	34.3	32.0	32.0	38.8	34.7	35.0	32.9
Am. Widgeon	7	2	2	5	3	2	1	3	...	...	...	...
	36.3	33.0	33.0	31.0	31.8	29.5	23.5	25.0	35.0	31.3	29.8	28.7
G. W. Teal	...	...	...	...	1	1	...	...	...	...	...	...
	...	...	...	...	13.0	11.5	...	...	13.0	11.5	...	...
B. W. Teal	2	2	2	...	7	...	1	2	...	...	...	...
	18.5	19.0	17.0	...	18.0	...	16.5	15.0	18.1	19.0	16.8	15.0
Shoveler	2	...	1	1	1	1	...	...	...	...	...	...
	26.0	...	25.0	21.0	25.5	23.5	...	...	25.8	23.5	25.0	21.0
Pintail	3	16	3	1.0	50	10	12	7	...	...	...	...
	42.7	40.9	40.3	35.6	41.4	40.1	35.0	32.6	41.5	40.6	36.1	34.4
Mottled Duck	5	...	1	...	21	...	3	6	...	...	...	...
	43.8	...	40.0	...	39.5	...	38.2	35.4	40.3	...	38.7	35.4

Grand Chenier

	Ma	*M. Sub-Ad.*	*Mi*	*Fa*	*F. Sub-Ad*	*Fi*
Blue Goose	3	...	1	4	...	...
	69.7	...	70.0	65.1	...	...
Snow Goose	1	...	...	...	...	...
	93.0	...	...	...	...	...
White-fronted Goose	...	...	...	1	...	...
	...	...	...	81.0	...	...

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*Upper figure in block is number of waterfowl weighed. Lower figure is average weight in ounces and tenths of ounces.
**Includes Little Pecan Bayou and Hawkins' Club.
***Weighted average.

WATERFOWL KILL IN LOUISIANA

The following table shows that the waterfowl kill in Louisiana was down in the 1962 season although waterfowl were present in their usual high numbers. Reductions in kill resulted from fewer hunters, greatly reduced bag limits and a short season. It is feared that the loss of hunter interest in waterfowling will result in neglect of waterfowl habitat maintenance in Louisiana.

Table V

ESTIMATED HUNTER BAG AND HUNTER EFFORT

Compared to 1961-1962 in Louisiana

Species	*1961*	*1962*	*Percent Change*
Hunting Season:			
Duck bag limit	3-6	2-4	.....
Days in duck season	20	25	.....
Total active hunters	35,940	30,830	−14.2
Hunters-days:			
Days per adult hunter	5.59	4.86	−13.1
State total	196,200	146,400	−25.4
Duck bag:			
Seasonal bag per adult hunter	8.05	5.36	−33.4
State total	276,300	157,900	−42.9
Goose bag:			
Seasonal bag per adult hunter	0.85	0.78	− 8.2
State total	28,900	22,600	−21.8

Table VI

ESTIMATED WATERFOWL KILL IN MISSISSIPPI FLYWAY

Species	*1961*	*1962*	*Change Percent*
Ducks:			
Dabblers			
Mallard	831,000	327,200	−61
Black duck	57,800	31,600	−45
Black X Mallard	3,800	1,800	−53
Mottled and Florida duck	16,200	5,300	−67
Gadwall	38,800	23,100	−41
American widgeon	97,300	39,000	−60
Green-winged teal	139,500	50,600	−64
Blue-winged teal	41,500	33,900	−18
Shoveler	17,300	11,000	−36
Pintail	77,500	39,400	−49
Wood duck	103,500	125,000	+21
Divers:			
Redhead	1,700	1,500	−12
Canvasback	200	100	−50
Greater scaup	8,800	8,100	− 8
Lesser scaup	150,700	33,300	−78
Ring-necked duck	78,400	62,700	−20
Goldeneye	5,900	4,600	−22
Bufflehead	13,700	8,000	−42
Ruddy duck	4,000	4,200	+ 5
Miscellaneous:			
Common and red-breasted merganser	1,000	500	−50
Hooded merganser	7,700	4,800	−38
Old squaw and eider	1,300	100	−92
Scoter	400	300	−25
Others and unknown	3,200	1,700	−47
Total*			
Retrieved	1,701,000	818,000	−52
Not retrieved	555,000	254,000	−54
Ducks killed	2,256,000	1,072,000	−52
Coots:			
Retrieved	69,900	69,400	− 1
Not retrieved	33,100	21,100	−36
Coots killed	103,000	90,500	−12

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*Duck totals estimated to nearest thousand.

Canada geese, considered the most stately waterfowl on the North American continent are highly-prized by hunters. The Louisiana Wild Life and Fisheries Commission, in cooperation with the U.S. Fish and Wildlife Service, has begun a live-trapping and transplanting program to bring Canada geese to Louisiana in an effort to build up migratory flocks of these splendid game birds.

WATERFOWL BANDING

From July, 1962 to December 1, 2,404 ducks were banded in Louisiana. At the writing of this report the total number of ducks banded for late 1963 and early 1964 cannot be tabulated thus the only total figures available are for the fall of 1962 to late fall, 1963. The following is a table of the results thus far.

Ducks banded in Louisiana for period of July 1, 1962 to December 1, 1963.

Lesser Scaup	1,268
Wood Duck	1,031
Blue-winged Teal	86
Green-winged Teal	19

It is expected that this total will be doubled as a great number of these ducks are trapped post season or in the early spring.

CANADIAN BANDING

Each year as a cooperative project states in the Mississippi Flyway Council send personnel to assist in banding waterfowl in Canada.

In July, 1962 through August, 1962, Commission Biologist Louis Brunett participated in the Canadian banding program in West Central Saskatchewan. A total of 1002 waterfowl were banded by his crew. The majority of waterfowl were gadwall, scaup, redhead and American Goldeneye.

During August, 1963, Refuge Division Biologist Bob Chabreck worked with a crew which banded ducks on this project in Southern Alberta. A total of 2160 ducks were banded. The major species were blue-winged teal, mallard and pintail.

FULVOUS TREE DUCK

In 1962 a graduate student in the Game Management Department of the School of Forestry of Louisiana State University conducted research on the fulvous tree duck. The Commission provided lodging facilities in the form of an army surplus house trailer and a pick-up truck for transportation.

The student, Robert B. McCartney, prepared a thesis entitled, *The Fulvous Tree Duck in Louisiana,* which was accepted by the University in partial fulfillment of the requirements for the degree of Master of Science.

An abstract of this 155 page document as it was prepared by Mr. McCartney appears below:

"The fulvous tree duck (*Dendrocygna bicolor*) has been known to breed in the southwest Louisiana rice belt since 1939. During 1962, field investigations were conducted in all sections of the southwest Louisiana marshes and rice belt. Spring concentrations of fulvous tree ducks occurred primarily in the fresh marshes of Cameron Parish. The pre-breeding population was estimated at 2,000 birds. Depredations to water-planted rice occurred during April and May, primarily in Jefferson Davis Parish. Pairing and dispersal had begun by April 30th and nesting by May 30th. Nesting continued until late August. The most significant breeding concentrations were found in the rice fields of Acadia, Evangeline, and Jefferson Davis Parishes. Extensive areas of seemingly favorable habitat were unoccupied. Fall population estimated indicated poor productivity in 1962. Limiting factors were believed to include rice culture practices, illegal hunting, predation, and human disturbances of nests and young."

RESEARCH DESIGN, MACHINE COMPILATION AND ANALYSIS OF DATA

FEDERAL AID PROJECT FW-2R

Introduction

Project FW-2R was initiated in July of 1959 with responsibilities in the fields of research data processing, program design and analysis, and survey coordination.

Work loads of the Project are varied in scope and in control, with some programs being entirely the responsibility of Project FW-2R while other programs are basically under supervision of various project and study leaders of the Pittman-Robertson and Dingell-Johnson programs. Some programs are jointly sponsored by Project FW-2R and one or more other Fish and Game Division projects.

Following is a summation of work accomplishments by Project FW-2R during 1962 and 1963.

Bird Banding Program

Project FW-2R is the coordinating authority for bird banding in the Commission. Among its duties are administrative reporting to the U. S. Fish and Wildlife Service; collection of all banding data within the Commission; design and updating of a data processing system; and the recording and machine manipulation of data periodically, as requested or for special analytical reports.

The original basic system described in the previous biennial has been revised and additional machine work planned. Revision in the original program was necessitated by a new reporting system of the Fish and Wildlife Service and because it was deemed necessary to more closely approximate the overall Service machine cards and operating procedures. Also, the availability of a Univac Solid State Computer (Univac 90) has increased the potential of our necessary processing and computations and we anticipate machine print-outs of certain reports that are now clerically handled.

The design of the new system involved planning of new (1) Field Banding Report, (2) machine card formats and (3) flow designs for machine processing and the handling of reports.

Banders in the field use the Field Banding Report to record their entries. The new punch card formats involved the redistribution of "fields" into different columns. We now use two punch card formats, one for banding and the other for retraps and recoveries.

Flow designs, the planned order of data processing, for the banding program are currently as follows:

HERBERT STERN, JR.
Leader, Federal Aid Project FW-2R

1. *Banding:* Processing for the banding program begins with the receipt of Field Banding Reports at the end of each month of banding. Then,
   (a) The field banding reports are furthe coded and audited by project persor nel.
   (b) Banding schedules and "foreign re traps" are reported to the U. S. Fis and Wildlife Service.
   (c) The banding data from the Fiel Banding Reports are punched int machine cards by one operator an verified punched by another operato The cards are then sent through verifier and errors are corrected.
   (d) Band cards are sorted by species an by band number within each species
   (e) Band cards are then filed in the Current Banding File. This file is arranged by species and by band number, within species.
   (f) At periodic intervals, or when requested, data from banding cards ca be sorted by specific breakdown designation.
   (g) These breakdowns are then tabulate and summary punch cards cut if necessary.
   (h) Periodic banding reports are the prepared from the above tabulations In most instances the tabulation from the punched cards or summar cards are used as the report.
   (i) Band cards annually are interfiled int the magnetic tape files and these files are updated.
2. *Retraps:* Retrap entries on the Field Banding Reports, which have been audited at the same time as the banding entries, ca fall into four distinct categories as designated by the Fish and Wildlife Service: a station repeat, a station return, a return outside the original latitude-longitude block of banding and a "foreign retrap". The coding of these categories, then, depends upon time lapse from banding or last retrap and location of the retrap in relation to banding. Foreign retraps are reported to the Service and are not punched.
   (a) Retrap cards are prepared for birds

that were originally banded by Commission personnel. Since we can mechanically add the banding information and retrap status to these cards later, only the retrap data given on the Field Banding Reports are punched into the cards at this time. The A.O.U. number (species identification) and band number are also punched.

(b) These cards are sorted by species and by band number within each species.

(c) Retrap cards are then filed in the Current Retrap File.

(d) Periodically, or when requested, these cards are sorted by specific breakdown designations; cards are tabulated; and reports prepared.

3. *Extension of retrap phase:* To complete the retrap cards, up-date files and make the necessary reports to the Fish and Wildlife Service, the following procedures are anticipated annually:

(a) All data concerning retrap cards of interest are pulled by Univac program from the various tape records and interfiled by band number and date within each band number. With this sequence, the Univac Program:

(b) punches banding data into each incomplete retrap card,

(c) computes the "type retrap" for each entry and punches this code into each card,

(d) accumulates this information and prints out the two reports required by the Fish and Wildlife Service.

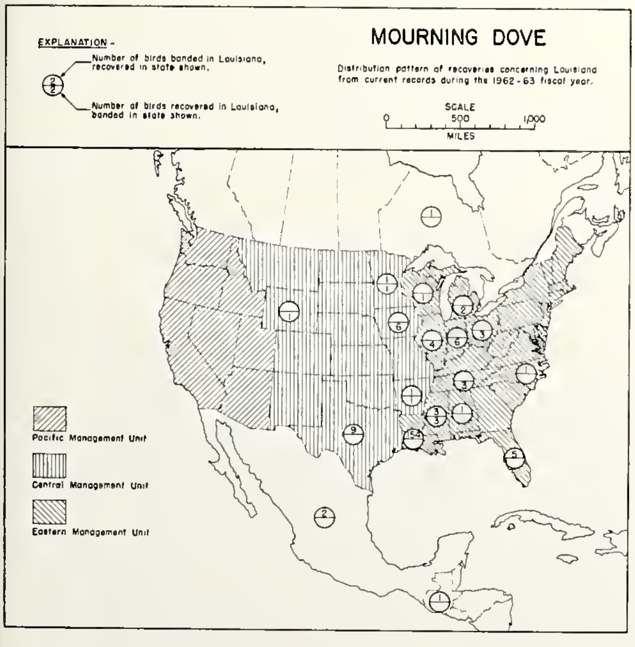
(e) All records are then up-dated into the tape files.

4. *Recoveries:* Recoveries and some return types are received by us on tabular printouts from the Fish and Wildlife Service. This is information on birds killed by hunters or birds that were reported killed by other means. Entries received are connected with the Louisiana banding program, the birds either being banded and/or recovered in Louisiana. Procedures in processing this data follow a general routine of audit, preparation of machine cards, verification, files and report sorts and tabulations.

Data processing of the banding program involved four work "types" during this biennium: (1) the current program, (2) backlog work for summary bandings and recoveries, (3) change over to new formats, and (4) location code book designations.

Current work is regarded as the monthly and periodic handling of the present banding system to include bandings, retraps and recoveries. The number of birds banded and retrapped over the past two and a half year period are shown in Table 1. Recovery records that were received during 1962-63 are shown in Table 2. No attempt is made in this publication to further breakdown these recoveries into years of banding or recovery. Also presented are several distribution maps showing the movement of species using the 1962-63 data.

Movement and banding-recovery analysis is a complicated research problem and one must consider recovery data in light of banding intensity and population strengths. Much preliminary work remains to be done before a serious study of this nature is started. It is implied, therefore, that the few figures presented here are for general information and a more comprehensive picture must wait until our backlog data has been completed.


MOURNING DOVE
Distribution pattern of recoveries concerning Louisiana from current records during the 1962-63 fiscal year.
EXPLANATION -
Number of birds banded in Louisiana, recovered in state shown.
Number of birds recovered in Louisiana, banded in state shown.
SCALE
0
500
1,000
MILES
Pacific Management Unit
Central Management Unit
Eastern Management Unit

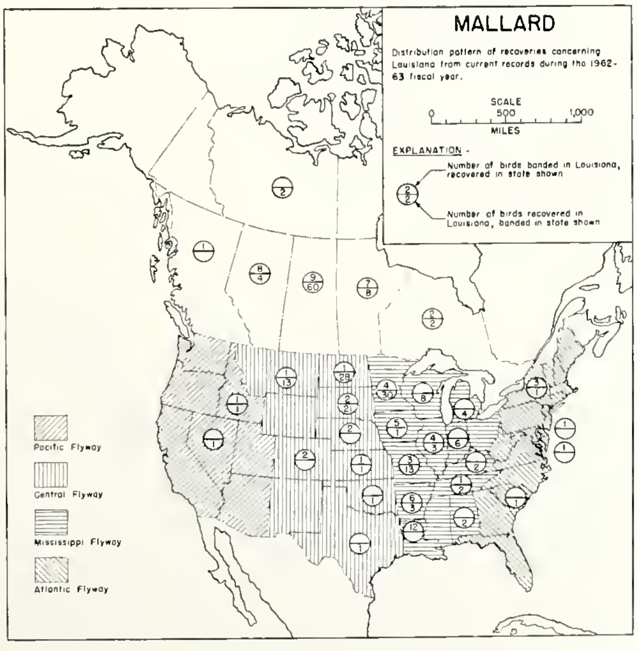

MALLARD
Distribution pattern of recoveries concerning Louisiana from current records during the 1962-63 fiscal year.
SCALE
0
500
1,000
MILES
EXPLANATION -
Number of birds banded in Louisiana, recovered in state shown
Number of birds recovered in Louisiana, banded in state shown
Pacific Flyway
Central Flyway
Mississippi Flyway
Atlantic Flyway

Table 1

NUMBER OF BIRDS BANDED AND RETRAPPED IN LOUISIANA BY WILD LIFE AND FISHERIES COMMISSION PERSONNEL

During the 1961-62 and 62-63 Fiscals.

	Birds Banded		*Number of Retraps*	
Species	*1961-62*	*1962-63*	*1961-62*	*1962-63*
Mourning Dove	957	471	774	250
White-winged Dove	6	0	4	0
Mallard	2	0	0	0
Wood Duck	548	631	330	522
Mottled Duck	0	5	0	0
Green-winged Teal	0	19	0	0
Blue-winged Teal	0	88	0	1
Lesser Scaup	0	1,258	0	213
Blue Goose	0	4	0	0
American Coot	0	20	0	0
American Woodcock	0	146	0	0
TOTAL	1,513	2,642	1,108	986

This small flock of blues and snows drop down for a rest in cattle grazing grounds near Grand Chenier.

Table 2

RECORDS OF RECOVERIES OF BIRDS BANDE IN OR RECOVERED IN LOUISIANA

(Received during the 1962-63 fiscal year fro U. S. Fish and Wildlife Service.)

Species	*Recoveries of Birds banded in Louisiana*	*Birds recovered in Louisiana (banded outside Louisiana)*
Hooded Merganser	0	1
Mallard	77	219
Black Duck	0	9
Gadwall	0	16
Am. Widgeon	0	26
Green-winged Teal	0	6
Blue-winged Teal	1	66
Unid. Teal	0	1
Cinnamon Teal	0	1
Shoveller	0	13
Pintail	0	81
Wood Duck	55	203
Redhead	0	2
Canvasback	0	1
Greater Scaup	0	1
Unid. Scaup	0	3
Lesser Scaup	9	132
Ring-necked Duck	2	7
Lesser Snow Goose	0	42
Blue Goose	0	139
Snow *or* Blue Goose	0	1
White-fronted Goose	0	21
Canada Goose	55	21
American Coot	0	20
American Woodcock*	326	4
Common Snipe	9	0
Mourning Dove	180	29
TOTAL	714	1,065

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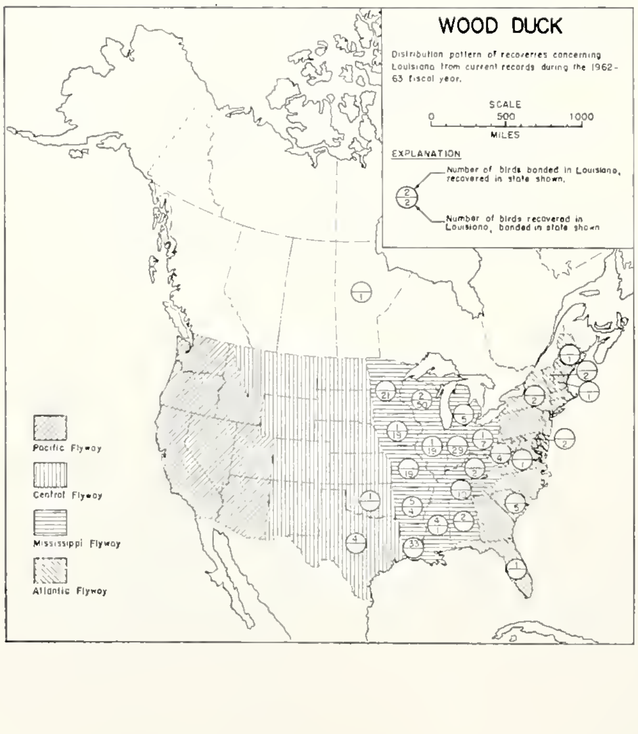
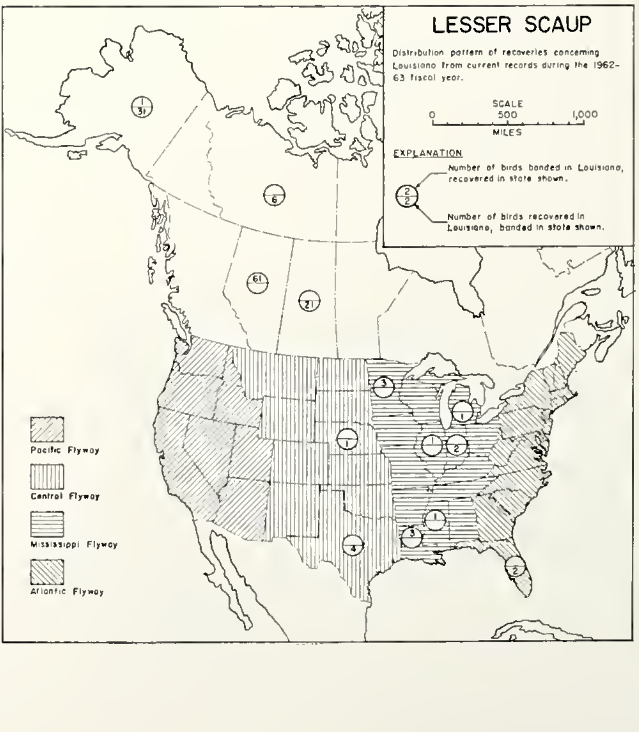
*Includes backlog data.



WOOD DUCK
Distribution pattern of recoveries concerning Louisiana from current records during the 1962-63 fiscal year.
SCALE
0
500
1000
MILES
EXPLANATION
Number of birds banded in Louisiana, recovered in state shown.
Number of birds recovered in Louisiana, banded in state shown
Pacific Flyway
Central Flyway
Mississippi Flyway
Atlantic Flyway



LESSER SCAUP
Distribution pattern of recoveries concerning Louisiana from current records during the 1962-63 fiscal year.
SCALE
0
500
1,000
MILES
EXPLANATION
Number of birds banded in Louisiana, recovered in state shown.
Number of birds recovered in Louisiana, banded in state shown.
Pacific Flyway
Central Flyway
Mississippi Flyway
Atlantic Flyway

Big Game Licensing System

A big game licensing system was inaugurated in Louisiana for the 1960-61 hunting season. At this writing we have three years of data as reported by the hunter. Special reports were issued on the results of these reports for each year. Although space will not permit inclusion of all data from the three hunting seasons, certain summaries are presented in Tables 3 through 7 of this Biennial.

It is obvious from the figures presented that the response of hunters was small and declined with each succeeding year. Originally it was hoped that from hunters' reports an evaluation of the kill on the various deer herds could be ascertained. However, report rates seemed to vary among regions of the state and from year to year, and no adequate means were available to assess a reliable estimate of kill. Because of this inadequacy, mass hunter reporting is to be discontinued for the 1963-64 hunting season and a survey system will be used instead. (See another section of this report for a discussion of the survey.)

Table 3

SUMMARY OF TOTAL DEER KILLED BY PARISHES AND GAME MANAGEMENT AREAS

Reported by hunters for three hunting seasons. (Numbers in parentheses are percentages.)

	Parish	*G.M.A.*	*Totals*
First Deer Killed			
1960-61	5,124	1,278	6,402
	(80.0)	(20.0)	
1961-62	4,371	573	4,944
	(88.4)	(11.6)	
1962-63	4,675	361	5,036
	(92.8)	(7.2)	
Second Deer Killed			
1960-61	401	47	448
	(89.5)	(10.5)	
1961-62	1,266	24	1,290
	(98.1)	(1.9)	
1962-63	1,680	11	1,691
	(99.3)	(0.7)	
Combined Totals			
1960-61	5,525	1,325	6,850
	(80.7)	(19.3)	
1961-62	5,637	597	6,234
	(90.4)	(1.9)	
1962-63	6,355	372	6,727
	(94.5)	(5.5)	

Table 4

SUMMARY OF TOTAL DEER REPORTED KILLED BY LICENSED AND PERMIT HUNTERS FOR THREE HUNTING SEASONS

(Numbers in parentheses are percentages.)

	Licensed Hunters	*Permit Hunters*	*Totals*
First Deer Killed			
1960-61	5,575	827	6,402
	(87.1)	(12.9)	
1961-62	4,198	746	4,944
	(84.9)	(15.1)	
1962-63	4,194	842	5,036
	(83.3)	(16.7)	
Second Deer Killed			
1960-61	402	46	448
	(89.7)	(10.3)	
1961-62	1,145	145	1,290
	(88.8)	(11.2)	
1962-63	1,460	231	1,691
	(86.3)	(13.7)	
Totals			
1960-61	5,977	873	6,850
	(87.3)	(12.7)	
1961-62	5,343	891	6,234
	(85.7)	(14.3)	
1962-63	5,654	1,073	6,727
	(84.0)	(16.0)	

Table 5

HUNTER REPORT RATES FROM VARIOUS GAME MANAGEMENT AREAS FOR THREE SEASONS

	1960-61		*1961-62*		*1962-63*	
Area	*N**	*Response %*	*N*	*Response %*	*N*	*Response %*
Catahoula	69	82.6	170	47.1	53	49.1
Chicago Mills	716	85.2	206	41.7	836	22.6
Evangeline	154	90.9	121	44.6	33	51.5
Jackson—Bienville	75	84.0	111	52.2	150	39.3
Red Dirt	175	90.9	137	55.5	41	41.5
Union	5	80.0	43	41.9	6	66.7
West Bay	278	81.3	443	41.8	68	36.8
Zemurray Park	45	77.8	36	44.4	27	51.9
Total and Average	1,517	85.3	1,267	45.2	1,214	28.9

*N=sample size

Table 6

SUMMARY OF HUNTER RESIDENT STATUS IN RELATION TO PARISH OF KILL

Resident Status	*Totals For First Deer*			*Totals For Second Deer*			*Totals For Licensed Hunters*			*Totals For Permit Hunters*		
	60-61	*61-62*	*62-63*	*60-61*	*61-62*	*62-63*	*60-61*	*61-62*	*62-63*	*60-61*	*61-62*	*62-63*
Resident of Parish of Kill	2,752	2,365	2,100	204	649	731	2,540	2,520	2,288	416	494	543
	(43.0)	(47.9)	(41.8)	(45.9)	(50.3)	(43.4)	(42.5)	(47.2)	(40.5)	(47.8)	(55.5)	(50.9)
Resident of Adjacent Parish of Kill	1,827	1,328	1,213	97	299	362	1,672	1,416	1,335	252	211	240
	(28.5)	(26.9)	(24.1)	(21.8)	(23.2)	(21.5)	(28.0)	(26.5)	(23.6)	(28.9)	(23.7)	(22.5)
Resident of Other Parishes	1,748	1,211	1,688	133	328	585	1,684	1,354	1,991	197	185	282
	(27.3)	(24.5)	(33.6)	(30.0)	(25.4)	(34.7)	(28.2)	(25.4)	(35.3)	(22.6)	(20.8)	(26.5)
Out-of-State Residents	74	35	25	10	13	7	78	48	31	6	0	1
	(1.2)	(0.7)	(0.5)	(2.3)	(1.0)	(0.4)	(1.3)	(0.9)	(0.5)	(0.7)	(0.0)	(0.1)
SAMPLE TOTAL	6,401	4,939	5,026	444	1,289	1,685	5,974	5,338	5,645	871	890	1,066

Table 7

SUMMARY OF RECEIPTS OF NOTICES OF PURCHASES, SUCCESSFUL HUNTERS AND NON-RESIDENTS FOR THREE SEASONS

Numbers in Parenthesis Are Percentages

	Notice of Purchases Recd.			*Number Hunters Successful**			*Number not Reporting***	
	1960-61	*1961-62*	*1962-63*	*1960-61*	*1961-62*	*1962-63*	*1961-62*	*1962-63*
Licensed Hunters	53,732	53,875	59,399	5,575	4,198 (7.9)	4,194 (7.2)	40,062 (74.4)	46,190 (77.8)
Permit Hunters	14,464	16,956	20,508	827	746 (4.5)	842 (4.2)	12,820 (75.6)	16,109 (78.5)
TOTAL	68,196	70,831	79,908	6.382	4,944 (7.1)	5,036 (6.5)	52,882 (74.7)	62,299 (78.0)

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*Success percentages are of known deer hunters.

**For 1960 season only successful hunters were required to report.

Service Data Processing Programs

Programs of research data processing were carried out as "services" to other projects and studies in the Fish and Game Division and also for the Refuge Division and the Division of Water Pollution Control. This function is considered one of the main areas of responsibility of Project FW-2R and includes determining feasibility of a program for machine processing, design of the program and the actual processing of data. Results of this work are presented elsewhere in this Biennial Report.

Sampling and Survey Programs

1. *Lake St. John Creel Census.* The purpose of the creel census on Lake St. John was to evaluate the effects of a proposed selective poisoning that was initiated in September, 1961. A summer creel census was carried out in 1961 and 1962 and results of this effort were reported in two separate reports, in 1962 and 1963.

Since a complete creel census was not feasible, a statistically designed sampling procedure was developed whereby estimates of total pressure and catch could be determined. The design incorporated the use of checking stations at five access points around the lake and included a pressure count over the entire lake during each of the periods of checking. Also included was an "on the lake" creel census of those persons whose access was a private camp.

Estimates of pressure and catch were developed by an expansion of source data and total estimates obtained by ratio estimators. Summary results of this survey are given in Tables 8 and 9. For a complete discussion of this program and its results, the reader is invited to read the two reports (Lake St. John Creel Census—Sampling Design and Estimation of Results, 1961; and, Lake St. John Creel Census—Estimations and Comparisons of Results, 1961-62) which can be secured through the Commission's New Orleans Office.

Table 8

SUMMARY OF TOTAL ESTIMATES FOR LAKE ST. JOHN CREEL CENSUS

Estimate Item	*Period*	*Stratum I*	*Stratum II*	*Total*
1. Estimated total fishermen hours for the lake	1962 (i)	19,841.8	12,622.3	32,464
	1962 (ii)	9,682.7	13,061.6	22,744
	1961	5,793.9	8,652.6	14,447
2. Estimated total number of fishermen (days) using the lake	1962 (i)	4,971.8	3,736.9	8,709
	1962 (ii)	2,757.1	3,545.6	6,303
	1961	1,667.1	2,221.6	3,889
3. Estimated total catch (number of fish) for all fishermen using the lake	1962 (i)	61,940.75	62,951.37	124,892
	1962 (ii)	27,284.24	50,908.34	78,193
	1961	10,027.93	14,869.97	24,898
4. Estimated total catch (pounds of fish) for all fishermen using the lake	1962 (i)	19,413.01	16,637.52	36,051
	1962 (ii)	10,308.30	23,988.81	34,297
	1961	3,556.50	5,930.32	9,487
5. Estimated total fishermen hours for *bass*.	1962 (i)	2,534.9	2,092.7	4,628
	1962 (ii)	3,555.0	5,544.7	9,100
	1961	2,443.8	5,036.5	7,480
6. Estimated total catch (number of fish) for *bass*........	1962 (i)	1,337.98	1,255.49	2,593
	1962 (ii)	1,948.97	6,766.01	8,715
	1961	1,162.92	2,777.10	3,939
7. Estimated total catch (pounds of fish) for *bass*........	1962 (i)	2,034.91	1,644.03	3,679
	1962 (ii)	2,997.95	11,444.39	14,442
	1961	1,366.52	3,511.67	4,878
8. Estimated total fishermen hours for *sunfish*..........	1962 (i)	16,650.1	10,439.2	27,089
	1962 (ii)	6,094.9	7,517.0	13,612
	1961	3,252.1	3,616.4	6,869
9. Estimated total catch (number of fish) for *sunfish*.....	1962 (i)	58,984.11	61,068.21	120,052
	1962 (ii)	24,817.09	43,780.47	68,598
	1961	8,550.19	11,890.78	20,441
10. Estimated total catch (pounds of fish) for *sunfish*.....	1962 (i)	15,992.25	14,407.61	30,400
	1962 (ii)	6,991.01	12,229.59	19,221
	1961	1,958.81	2,236.82	4,196

Table 9

SUMMARY OF DATA COLLECTED AT SAMPLING DOCKS, LAKE ST. JOHN CREEL CENSUS

		Stratum I		*Stratum II*	
Item	*Period*	*Source Data*	*Expanded Totals**	*Source Data*	*Expanded Totals***
Number of fishermen	1962 (i)	301	3,293	125	2,440
	1962 (ii)	133	1,510	98	1,990
	1961	132	1,434	88	1,799
Number of parties	1962 (i)	144	1,575	67	1,308
	1962 (ii)	65	738	51	1,036
	1961	66	717	40	818
Fishermen hours	1962 (i)	1,201.25	13,142	422.25	8,245
	1962 (ii)	467.00	4,303	361.00	7,331
	1961	458.75	4,984	342.75	7,005
Number of fish	1962 (i)	3,750	41,026	2,106	41,120
	1962 (ii)	1,316	14,943	1,407	28,573
	1961	794	8,626	589	12,039
Pounds of fish	1962 (i)	1,175.3	12,858.02	556.6	10,867.84
	1962 (ii)	497.2	5,645.61	663.0	13,464.01
	1961	281.6	3,059.36	234.9	4,801.10
Hours fished for bass	1962 (i)	153.30	1,679.3	70.00	1,366.8
	1962 (ii)	171.50	1,947.3	153.25	3,112.2
	1961	193.50	2,102.2	199.50	4,077.5
Number of bass	1962 (i)	81	886.2	42	820.1
	1962 (ii)	94	1,067.4	187	3,797.5
	1961	92	999.5	108	2,207.4
Pounds of bass	1962 (i)	123.2	1,347.8	55.0	1,073.9
	1962 (ii)	144.6	1,641.9	316.3	6,423.3
	1961	108.2	1,175.5	137.5	2,810.3
Hours fished for Sunfish	1962 (i)	1,008.00	11.027.7	349.25	6,819.2
	1962 (ii)	294.00	3,338.3	207.75	4,218.9
	1961	257.50	2,797.5	143.25	2,927.8
Number of sunfish	1962 (i)	3,571	39,067.5	2,043	39,890.4
	1962 (ii)	1,197	13,591.7	1,210	24,572.3
	1961	677	7,355.0	471	9,626.6
Pounds of Sunfish	1962 (i)	968.2	10,592.3	482.0	9,411.2
	1962 (ii)	337.2	3,828.8	338.0	6,864.0
	1961	155.1	1,685.0	88.6	1,810.9

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*Expansion Factors, Stratum I: 1962(i)=10.9402; 1962(ii)=11.3548; 1961=10.8642

**Expansion Factors, Stratum II: 1962(i)=19,5254; 1962(ii)=20.3077; 1961=20.4387

2. *Old River Creel Census.* A sampling scheme designed to estimate pressure and catch for Old River, Pointe Coupee Parish was requested as a method of obtaining data before the construction of a low sill dam which will raise the mean water level. The creel census was conducted in July and August of 1962.

The sampling design consisted of checks at the four commercial docks since close to 100 percent of the fishermen gained access through these points. Each dock was to be sampled with equal probability and the four daily time periods (4 hours each) were permutated in order to balance checking periods for each sampling dock. Days were stratified into three orders by expected fishing pressure; I Saturdays and holidays, II Sundays and weekdays, and III Rodeo days. Strata I and III were sampled each day of occurrence while Stratum II was sampled approximately 1/3 of occurrence.

A complete description of the design and results of the creel census is available through the Commission's New Orleans Office. Summary results are presented as Tables 10 and 11 of this Biennial.

3. *Dove Kill Survey.* The feasibility of using a telephone survey as a primary sampling frame along with an area-time sampling frame was investigated during the 1960-61 hunting season and reported on in the previous Biennial and in two publications.

Results of the analysis of this work were reported on at the 16th Annual Conference of the Southeastern Association of Game, Fish and Conservation Commissioners, Charleston, South Carolina, October, 1962. This research project was a joint contribution among the Louisiana Wild Life and Fisheries Commission (Projects W-29R and FW-2R), Tennessee Game and Fish Commission and the Southeastern Cooperative Fish and Game Statistics Project, Institute of Statistics, North Carolina State College. The 1960-61 pilot study showed that a telephone frame was feasible and further experience gained by Tennessee in a state-wide survey aided in refinements of the telephone frame as a sampling method.

Table 10

EXPANDED ESTIMATES OF PRESSURE COUNTS FOR OLD RIVER CREEL

Census, July and August, 1962

	July	*August*
1. Number of parties	1,773	952
2. Number of fishermen	4,277	2,016
3. Man hours fished	22,545	10,825

Table 11

EXPANDED ESTIMATES OF CATCH BY SPECIES FOR OLD RIVER CREEL

Census, July and August, 1962

Species	*July*		*August*	
	Number	*Pounds*	*Number*	*Pounds*
Largemouth Bass	1,343	1,684	1,214	1,518
Kentucky Bass	0	0	4	1
White Crappie	13,785	8,822	3,033	2,005
Bluegill Sunfish	24,018	7,761	15,327	4,566
Redear Sunfish	473	191	101	50
Warmouth Sunfish	149	59	60	25
Longear Sunfish	104	24	0	0
Spotted Sunfish	57	13	0	0
Yellow Bass	291	165	268	114
White Bass	263	227	31	30
Catfish (all spp.)	511	619	136	130
Other species	317	393	79	101
TOTAL	41,311	19,958	20,253	8,540

Administrators of the Commission requested that information be obtained, beginning with the 1963-64 hunting season, on hunter activity and kill of mourning doves over the state and with estimates for each of the three segments of the season. The telephone survey method was to be employed and the survey was jointly undertaken under Projects W-29R and FW-2R.

Data obtained from this survey will be derived from hunters with a telephone in the household; therefore, the universe of interest will be telephone households and not the total number of dove hunters. However, it has been shown that a large number of dove hunters do have a telephone in their household and the estimates can be used to compare hunting intensity and kill over segments of each season and to obtain yearly trends.

Louisiana has about 670,000 residential main stations, in nine districts (Southern Bell Districts). Each district was divided evenly into zones with about 30,000 stations per zone (except New Orleans) and from one to four zones per district. Each zone was then divided into 30 sampling units, each unit containing about 1,000 stations (with 2,000 in New Orleans), with the boundaries of the sampling units coinciding with exchanges. The sample was then drawn by selecting from each of the 20 zones, two sampling units at random. Approximately 15,000 new calls will be made after each of the three segments of the hunting season. Certain research factors have been set up for the first hunting season (1963-64) in order to determine the most effective and economical means of conducting the survey in the future. These functions include analysis on pre-contacts and memory bias.

Since the 1963-64 hunting season is still in progress at the writing of this report, results must be deferred until a later date.

On the Chicago-Mill area, where 11,888 hunters killed 1,360 deer during the 1963-64 season, a youngster gets the low-down on deer aging technique as explained by Commission technician Howard Blunt.

In Central Louisiana sportsmen find the Evangeline area to their liking. Managed under an agreement with the United States Forest Service, this 15,000-acre tract attracted more than twelve hundred deer hunters during the season. Note the healthy animal on the car's hood.

4. *Deer Kill Survey.* For the past three years (beginning with the 1960 season) Louisiana has maintained a big game licensing system. As part of this system hunters were supposed to return notice of purchase cards and deer report cards in order that an estimate of the deer kill could be obtained. Because of the lack of response to this system of reporting deer kill, estimates were extremely unreliable. Therefore, it was decided that beginning with the 1963-64 hunting season a sampling system be initiated which would question approximately 10 percent of the persons who purchased big game licenses.

The survey will be by mail questionnaires and three mailings at one month intervals are scheduled beginning about February 1, 1964. Sampling will be at random utilizing the last two digits of the big game license, one number being drawn for each of ten subsamples of license and permit holders. Three measures of estimates are to be obtained by Univac computations and the method yielding the smallest variance will be used for estimates. Reporting on results will follow the hunting season now in progress.

Fisheries Section

HARRY E. SCHAFER
Supervisor
Dingell-Johnson Coordinator

During the last biennium, the Fisheries Section received funds in addition to the two regular sources from a third and quite unexpected source—the U. S. Department of Labor. The 87th Congress authorized an Accelerated Public Works Program to provide employment relief in designated economically-distressed countries throughout the nation. Funds were allocated for use by the Louisiana Wild Life and Fisheries Commission under provisions of the Federal Aid Acts for Capital Improvement Projects (no land acquisition was permitted) on a 50-50 matching basis. The other two regular sources of funds used for research management, development, and maintenance are: first, from the Commission's annual budget; and second, from the Federal government under the Dingell-Johnson program. This federal money, which is derived from a federal excise tax on fishing tackle, is allocated to the state based on the number of fishing licenses sold and on the land area of the state. Louisiana could receive more of this Federal money if the state would require all fishermen to have an angler's license.

Five Dingell-Johnson projects were underway during this biennium. All were initiated and reported on during the preceding biennial report. One of these projects was completed and a final report prepared. It was an age and growth study of Louisiana game fishes.

The three state fish hatcheries were operated with great success during the past two years. The management project moved forward and sampled fish populations in most of our popular waters. The fish parasite study and the primary productivity study were again continued.

A more detailed report on the activities of each project follows.

FARM POND PROJECT

SAMMY STOKES
Fishery Biologist

The farm pond project was instituted by the Louisiana Wild Life and Fisheries Commission to meet public demands for advice concerning the management of farm ponds, and other water bodies used for sport fishing.

Interest in farm pond management has climbed steadily since the project's initiation but another phase of pond management has attracted more public interest during the past few years. This is the rearing and production of commercial fish for home consumption and for market. There is also a great deal of interest in the rearing of channel catfish *Ictalurus punctatus* as a sport fish.

In February 1963 the Louisiana Wild Life and Fisheries Commission in conjunction with the Soil Conservation Service initiated an experimental project designed to foster information which would aid persons interested in raising channel catfish for home consumption and sport fishing.

Four pond sites were selected in Central Louisiana for the experiment. The ponds range in size from one-fourth acre to three acres. The channel catfish (fingerlings) weighed 10 pounds per 1000 at the time of stocking, February 19, and 20, 1963, and were stocked at the rate of 400 per acre. There was no supplemental feeding, only proper fertilization. Bass were added to the pond in June, 1963, at the rate of 25 per acre to control wild fish.

Samples of these channel catfish were taken, August 16, 1963, and September 10, 1963, by seining methods. The size ranges were from one-fifth to one-third pound. I think the slow growth in this case was due to two factors: the ponds were new and the turbid water inhibited proper fish growth; and due to the dry weather some of the ponds never reached normal pool state or spillway level. Since the ponds never reached the maximum acreage, it is possible the food supply could have been below the expected level.

The final results as to number of recoveries, total poundage, etc. are not available at this time but should be available in the near future.

These are two factors that I consider important in rearing channel catfish for sport and home consumption. Some sort of screen structure should be constructed on the spillway to prevent the loss of the initial stocking, since catfish will leave the pond very readily in times of overflow. It is important to keep the screen clean to prevent levee wash outs around the spillway.

The other factor is, if channel catfish are to be stocked in supplement with bass and bluegill, the catfish should be stocked prior to the bass stocking. If the bluegill and bass are stocked prior to the channel catfish stocking, the bass will prey very readily on the catfish fingerlings and the return is very low.

The Louisiana Wild Life and Fisheries Commission does not furnish channel catfish fingerlings to private pond owners, but they can be purchased readily at a relatively small cost from several individuals throughout the state.

The Louisiana Wild Life and Fisheries Commission checked approximately 220 ponds during the previous biennum with an over-crowding of forage fish still being the largest problem by far.

I am of the opinion that the pond owners are much to blame for this problem. There is a lack of fishing efforts in almost all ponds. As many fish as possible should be taken with hook and line. Secondly, many pond owners fish more selectively for carnivorous fish (bass) than for forage fish (bluegill). At least seven pounds of forage fish should be removed for each pound of carnivorous fish.

Another serious problem in Louisiana is the control of wild fishes, particularly, green sunfish, *Lepomis cyanellus* — bullhead, *Ictalurus* sp. and orange spotted sunfish, *Lepomis humilis*. Most of these wild fishes gain entrance via the spillway as most spillways do not have a sharp enough drop at the point of overflow. Another good source of entry is by creeks, bayous, etc. which back into ponds over the spillway at certain periods of high water.

Soon to be published is a booklet prepared for the Louisiana Wild Life and Fisheries Commission by Max Summers. This publication was designed to cover the problems of pond management in general and of Louisiana in particular. This guide will be of great help to pond owners and to the Commission, since the Louisiana Wild Life and Fisheries Commission does not have the personnel nor the time to give continuous assistance to all the pond owners and to their individual problems.

FISH HATCHERIES

SAMMY STOKES
Fishery Biologist

There are three fish hatcheries within the State of Louisiana which are owned and operated by the Louisiana Wild Life and Fisheries Commission.

The names and locations are as follows:

1. Huey P. Long Fish Hatchery
   Lacombe, Louisiana
2. Beechwood Fish Hatchery
   Forest Hill, Louisiana
3. Monroe Fish Hatchery
   Monroe, Louisiana

These fish hatcheries are designed and operated with the purpose of furnishing as many fish as economically as possible for the sport fishermen of Louisiana.

The fish are available to the public for both private ponds and public impoundments. I might add that they are delivered to the pond site without any cost to the owner.

The procedure of obtaining fish through the Louisiana Wild Life and Fisheries Commission is as follows. A person interested in having his pond stocked should write to the Louisiana Wild Life and Fisheries Commission, 400 Royal Street, New Orleans, for an application. The application should be filled out in detail and returned to the Commission's Fish and Game Division. The pond will then be inspected and if it meets minimum requirements, it is then placed on file to receive a shipment of bluegill and bass. If the pond is over 10 acres sometimes black crappie are stocked in supplement with the bass and bluegill.

In the fish hatcheries the following species of fish are propagated for public distribution: bluegill *Lepomis macrochirus*, largemouth black bass *Micropterus salmoides*, black crappie *Pomoxis nigromaculatus*, and channel catfish *Ictalurus punctatus*. There is an experimental pond of tilapia *Tilapia mossambica* at the Lacombe hatchery.

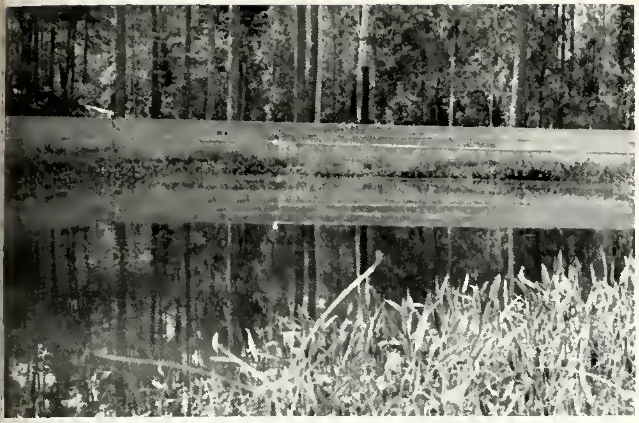
The fish are removed from the hatcheries twice each year. The bluegill, crappie and channel catfish are removed in January. The ponds are then stocked with brood bass and the bass fingerlings are removed in May. The fingerlings are hauled to their destination in oxygen aerated fish transport tanks on trucks.

The production of the fish hatcheries in numbers and species for the 1962-63 biennum are as follows:

1. Huey P. Long Fish Hatchery
   Lacombe, La.
   152,400 bass. (Tilapia reared experimental only)
2. Monroe Fish Hatchery
   Monroe, La.
   319,770 bass
   739,600 bluegill
   120,650 channel catfish
3. Beechwood Fish Hatchery
   Forest Hill, La.
   406,600 bass
   2,021,060 bluegill
   61,200 black crappie

There were 217 areas stocked throughout the state during the previous biennum. Among the public areas stocked were: (1) Red Chute Cutoff, Bossier Parish, (2) Sibley Lake, Natchitoches, (3) Iatt Lake, Colfax, (4) Spanish Lake, New Iberia, (5) Kepler Creek Lake, Bienville Parish, (6) Anacoco Lake, Leesville, (7) Chicot Lake, Ville Platte, and (8) Coughlin Power Plant Reservoir, St. Landry, and (9) Bayou D'Arbonne Lake near Monroe.

One thousand adult Tilapia were removed from the Lacombe Fish Hatchery and carried to St. Landry and placed in the Coughlin Power Plant Reservoir. They were stocked in the spring and summer of 1963 for experimental purposes. The water that is used for cooling purposes in the power plant flows back into the lake with its temperature raised approximately 30 degrees. Since Tilapia perish at 48 degrees and will stop feeding at 60 degrees, it is hoped that the flow of this exceptionally warm water into the reservoir from the plant will allow enough water to



Enclosed frog pond. Tin fence is about four feet high, and is buried in the ground six inches. Note light which is used to attract insects at night.

remain at temperatures that will permit a successful fishing of the species. Tilapia were stocked experimentally at Beechwood and Monroe Fish Hatcheries with 100% mortality during winter months. A population sample will be taken next spring from Coughlin Reservoir to see if any Tilapia survived.

Last, but not least, there is a bullfrog rearing project at Beechwood Fish Hatchery, which was initiated in March, 1963.

Two pens were built of tin of the following dimensions. One pen was 70′ x 30′ x 4′ high. The other was 95′ x 60′ x 4′ high. The pens were built around small ponds. Twenty males and thirty-three females were placed in these ponds in March, 1963. Spawning took place from April 4, 1963, through June 18, 1963. After spawning all the brood frogs were put into the 70′ x 30′ pen and the tadpoles remained in the 95′ x 60′ pen.

The tadpoles were fed shredded oatmeal with small amounts of antibiotics added. I might add that most of the tadpoles did not stay in the tadpole stage for one year as generally believed.

Electric lights were strung across both pens and lighted nightly to attract insects for frog food. This worked very well, especially with the large brood frogs. The brood frogs are being retained to see if they will spawn more prolifically after becoming accustomed to living in an impoundment.

Female and male bullfrog brood stock used in frog farming experiment.

The ponds were drawn down in October to remove wild fishes from the ponds. During this operation 100 frogs were gathered and measured, their average length was 2.5 inches. There were also some tadpoles measured; their average length was 2.5 inches also.

The main problem in rearing the frogs seems to be the food supply, since they are strictly live feeders. Plans are being made for experiments with various types of food supplies.

Four month old bullfrog approximately 2½ inches in length.

BOAT LAUNCHING

HARRY E. SCHAFER, JR.

Dingell-Johnson Coordinator, Supervisor

During the last year of this biennium, the Federal Congress passed Public Law 87-658, Accelerated Public Works Program to provide employment relief in designated economically-distressed counties throughout the nation. Funds were allocated for use by the Louisiana Wild Life and Fisheries Commission, under provisions of the Federal Aid Acts in improvement projects (no land acquisition is permitted) on a 50-50 matching basis. The Commission choose to use most of the money for the construction of boat launching ramps with parking areas.

With the money designated for boat launching ramps and parking areas, the Commission plans to construct 59 ramps in 32 parishes. Of the 59 ramps planned, thirteen have been completed, four are under construction and the remainder are in various stages of planning.

The following are the locations of the boat launching ramps and parking areas:

In cooperation with the Louisiana Department of Highways, the Louisiana Wild Life and Fisheries Commission has completed these ramps.

Boat launching ramp and parking area constructed on Cane River Lake at Bermuda Bridge.

Calcasieu River	Allen Parish
Port Vincent	Ascension Parish
Bayou Francois	Ascension Parish
Prien Lake Park	Calcasieu Parish
Ouachita River	Catahoula Parish
Bayou Macon	Franklin Parish
Vermilion River	Lafayette Parish
Sibley Lake Reservoir	Natchitoches Parish
Cane River Lake	Natchitoches Parish
Lake Charles	Calcasieu Parish
Whiskey-Chitto Creek	Allen Parish
Calcasieu River at Oakdale	Allen Parish
Lower Anacoco Lake	Vernon Parish

In cooperation with the Louisiana Department of Public Works the following sites are under various phases of construction and planning:

Black Lake, Sec. 15	Natchitoches Parish
latt Lake, east end of dam	Grant Parish
Krotz Springs, Atchafalaya River	St. Landry Parish
Lake Dauterive	St. Martin Parish
Horseshoe Lake	Concordia Parish
Upper Anacoco Lake, east side	Vernon Parish
Big Creek	Avoyelles Parish
Fort Pike	Orleans Parish
Clear Lake	Natchitoches Parish
Black Lake, Sec. 13	Natchitoches Parish
Half Moon Lake	St. Landry Parish
Atchafalaya River at Butte LaRose	St. Martin Parish
Bayou Benoit	St. Martin Parish
Tanho Harbour	Tangipahoa Parish
Old River	Livingston Parish
Bayou Falcon	Catahoula Parish
Black River, Jonesville	Catahoula Parish
Old River at Mansura	Avoyelles Parish
Red River at Lower Brouillette	Avoyelles Parish
Pearl River at Hwy. 10	Washington Parish
Pearl River, 5 miles north of Bogalusa	Washington Parish

Bonnabel Canal	Jefferson Paris
Rosethorn Park	Jefferson Paris
Mississippi River at Donaldsonville	Ascension Paris
Cooter Point	Franklin Paris

The following sites are waiting approval fro the Department of Commerce in Washingto D. C.:

Belle River at Pierre Part	Assumption Paris
Pierrie Part-Lake Verret	Assumption Paris
Calcasieu Lake at Grand Lake	Cameron Paris
Tensas River at Clayton	Catahoula Paris
Little River near Georgetown	Grant Paris
Bayou Pigeon at Bayou Sorrel	Iberville Paris
Lake Long Canal at Plaquemine	Iberville Paris
Bayou Lacassine near Lake Arthur	Jefferson Davis Paris
Lake Arthur at Lake Arthur	Jefferson Davis Paris
Intercoastal Waterway at Lockport	Lafourche Paris
Wisner near Leeville	Lafourche Paris
Lake D'Arbonne near Dubach	Lincoln Paris
Cheniere Lake near Monroe	Ouachita Paris
Bayou Des Allemands at Des Allemands	St. Charles Paris
Boutte Canal at Boutte	St. Charles Paris
South Pass at Manchac	Tangipahoa Parish
Lake D'Arbonne at Bayou Corney	Union Paris
Lake D'Arbonne at north end of dam	Union Paris
Lake D'Arbonne at south end of dam	Union Parish

Boat launching ramp and parking area constructed on Calcasieu River.

Boat launching ramp and parking area constructed on Amite River at Port Vincent.

IMPOUNDED TIMBER EVALUATION PROJECT

SAMMY STOKES
Fishery Biologist

Construction of ponds to be used to evaluate the removal of trees for an impoundment on the production of fish and fish goods.

This project was planned and initiated with the sole purpose of evaluating the effect of complete timber removal as compared with no timber removal on actual fish production in small impoundments.

Two five acre lakes were constructed as nearly identical as possible. One was completely removed of all timber and underbrush and the other was left in its natural state as near as possible. Each impoundment has a control structure that will allow complete drainage and fish removal at the end of the experiment. The experiment will be carried on for two years from the date of the initial stocking of the bass.

Signs will be placed at intervals around the impoundments to prevent fishing. No fish will be harvested until the end of the experiment.

The Bodcau Game Management Area was chosen for the site of this experiment since it belongs to the U. S. Army Corps of Engineers and leased to the Louisiana Wild Life and Fisheries Commission.

Construction work on these impoundments was under direction of the Commission's engineer. The construction work was completed during the summer of 1963, and the impoundments will be stocked in January, 1964, at the rate of 1000 bluegills per acre. Bass will be stocked in May at the rate of 100 per acre.

Annual reproduction samples will be taken with a ¼ mesh reproduction seine at five intervals in each lake.

Quarterly bottom samples and plankton samples will be taken at two stations in each lake. Field water chemistry determinations will be made at the same time. Aquatic organisms will be preserved and identified.

Since the construction of the impoundments is as far as the experiment has progressed, there is no information available at this time, but it should prove valuable for making future analyses of similar impoundments.

After the experiment is completed, the ponds will be restocked for public fishing.

Bioassay Project

JAMES T. DAVIS
Fishery Biologist
JANICE S. HUGHES
Fishery Biologist

The control of aquatic weeds is a problem in many lakes in the Southern United States. Louisiana has many different kinds of weeds, and hence many different problems. Failure to control these weeds will result in loss of fishing and other recreational uses.

Some weeds may be controlled through water level fluctuation. Other weeds may require chemical control. This project was designed to determine which herbicides can be used on aquatic weeds without harming the fish. This project has two phases; laboratory studies for fish toxicity and pond studies to determine effects on weeds.

Eighty-seven types of materials have been evaluated in this study. This information is available upon request to the Commission's main office.

LABORATORY

Chemicals are first tested in the laboratory in 6 gallon aquariums using fingerling bluegill sunfish. For each chemical trial concentrations are established and later verified. From this a TL_m (median tolerance limit) is established which indicates the amount of chemical which half of the fish can survive. The use of this TL_m varies. As a general rule one-tenth of the amount for a TL_m can be safely used in field applications.

POND STUDIES

This portion of the project is set up to determine the effect of some herbicides on common aquatic weed problems. Determination of the chemical to recommend is based on three things: (1) will it kill the weed (2) is it economical (3) is it on the market.

The more common aquatic weeds and a recommended chemical application rate for their control have been determined. For further information on these results consult your district Wild Life and Fisheries Commission office.

Identification of the problem aquatic weed is most important if satisfactory results are to be obtained. Due to limited space it is not possible to give identifying pictures of each plant. Therefore, you should consult your district fisheries biologist for identification.

One other word of caution should be emphasized, *Read The Label* on each can of herbicide.

LAKE MANAGEMENT PROJECT

SAMMY STOKES
Fishery Biologist
KENNETH LANTZ
Fishery Biologist

The primary responsibilities of this project are research and management. The lake management personnel conduct research studies of our many impoundments to determine the most suitable management plan for each lake concerned.

Each lake in our state is a project within itself since no two lakes are exactly alike in characteristics. This is why each lake must be studied before any suitable management plans can be drawn up for the lake concerned.

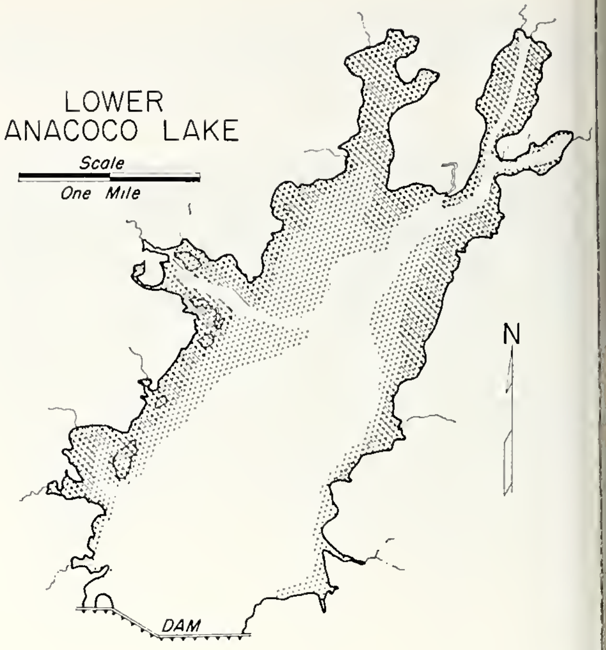
Annual population samples of our many lakes assist greatly in drafting recommendations for managing these lakes. Population samples are taken by use of rotenone, seines, nets, traps and electricity.

It is impossible to take annual population samples of all our impoundments for obvious reasons; therefore, we conduct annual surveys of the more important lakes only. Other lakes are sampled periodically or by specific request. Following is a list of some of the lakes sampled and recommendations:

LOWER ANACOCO LAKE
VERNON PARISH

On July 16, 1962 the Anacoco-Prairie State Game and Fish Commission adopted a resolution that control of Lower Anacoco Lake be turned over to the Louisiana Wild Life and Fisheries Commission for a period of five years for the purpose of retarding vegetation production and managing the fish populations through water fluctuation. The basis for this resolution was results rendered by the experimental drawdown of 1961, as has been described in the 1960-61 Biennial Report.

Fishermen began to bring in numerous limits of crappie and largemouth bass in late fall, 1961 and spring, 1962 as a result of the water drawdown of July, 1961. Fishing during the spring of 1962 was as good as was that experienced during the first three or four years following creation of the lake. Fish population samples taken by the Louisiana Wild Life and Fisheries Commission in June, 1962 and compared to June, 1961 samples indicated that a definite favorable change had occurred in association with the 1961 drawdown. The percentage of game fish to the total fish population increased from 57% in 1961 to 73% in 1962, including a largemouth bass population increase from 7% of the total population in 1961 to 11% of the total population in 1962. This game fish increase was accompanied by a decrease in the gizzard shad from 39% of the total population in 1961 to 23% of the total fish population in 1962. These statistics indicate there was a decrease in the percentage of non-game fish comprising the fish population of the lake following the 1961 drawdown, as is indirectly shown by the numerous limits of game fish caught during the winter of 1961 and spring of 1962.



▒ Extent of vegetation appearing at the surface on July 1, 1962 prior to water drawdown that month.

▨ Extent of vegetation appearing at the surface on July 1, 1963 prior to water drawdown that month.

The 1962 drawdown was initiated by the Louisiana Wild Life and Fisheries Commission and Louisiana Department of Public Works following adoption of the Anacoco Lake Commission resolution. Extreme drought conditions during the summer and fall of that year resulted in an extended six feet drawdown as desired in the management plan outlined in the Ninth Biennial Report. Good fishing reports continued to come from the lake during the 1962 drawdown, but slowed down during the winter as rising waters gradually filled the lake.

During the spring of 1963 fishing again picked up, continuing until the time for the July drawdown. One noticeable difference in the effects of drawdown during the spring of 1963 and the spring of 1962 was the reduced amount of submerged vegetation reaching the water surface prior to July. Reference to the map shown on this page will reveal the extent of vegetation appearing at the water surface on July 1, 1962 and July 1, 1963. Approximately 40% of the lake showed this condition in 1962, while only 20% of the lake exhibited this condition in 1963. This was a 50% increase in access in the northern part of the lake during the spring months.

The 1963 drawdown was begun July 8, and drought conditions of this year indicate a fluctuation comparable to 1962 will occur this year. The Louisiana Wild Life and Fisheries Commission will continue this fluctuation program on Lower Anacoco Lake through the next four years while the lake is under its supervision.

BARKSDALE AIR FORCE BASE

Rotenone samples were taken in Clear, Flagg, and Harmon Lakes, to determine the standing fish populations. Recommendations were made for Harmon Lake only. The management plan consisted of a fertilization program and an experimental introduction of the flathead catfish *Pylodictis olivaris* to control bullheads, since 39.5% of the total weight consisted of bullheads.

At this time it is not known if the flatheads were introduced; if they were, plans will be made to take population samples of Harmon Lake to ascertain the reduction of the bullhead population.

CHEMIN-A-HAUT STATE PARK LAKE

A population sample was conducted in Chemin-A-Haut State Park Lake in October, 1963, to determine components of the standing fish population.

The results revealed approximately 75% of the total fish population was shad.

From the results of these surveys it was recommended that the lake be selectively poisoned to remove the shad.

This operation was performed by the Louisiana Wild Life and Fisheries Commission October 17, 1963.

Samples will be made next year to determine the success of this operation.

KEPLER LAKE

Bienville Parish

Kepler Lake is a 2,000 acre impoundment in Bienville Parish.

Spraying rotenone inside enclosed one acre area to take a fish population sample.

Population samples were taken in the lake and also the aquatic weed problem was studied. From the surveys made, the following recommendations were drawn up.

A drawdown was initiated in June and the lake was lowered four inches per week until it had dropped 20″. After this period it was dropped at a rate of 4″ per day until the water was down to the desired level. The normal spillway level is 176.5′ mean sea level, and it was recommended to drop the water level 7 feet or to the 169.5′ mean sea level.

The purpose of these recommendations were threefold:

1. To control undesirable species of submerged aquatic weeds. These undesirable weeds are a nuisance to the fisherman and provide cover for panfish which is undesirable.
2. To expose large areas of land in the shallow area. This stimulates growth of feed for ducks, etc. and adds to the fertility of the lake.
3. To control the numbers of forage fish and keep the ratio between the forage and car-

Fisheries crew putting out block-off seine to enclose a one acre area in order to take a fish population sample.

nivorous fish balanced. Impoundments such as Kepler Creek, with all its dead timber and aquatic weeds afford too much cover for the forage fish (bluegill, red-ear, etc.). By lowering the water level they are congregated into a much smaller area and are more readily fed upon by the carnivorous species, particularly bass.

Application of fish toxicant (rotenone) in a blocked off square surface acre of Old River, Pointe Coupee Parish to determine the fish population of the lake.

Crew spraying rotenone in pot holes to kill fish prior to filling Sibley Lake, Natchitoches.

LAKE LOUIE

CATAHOULA PARISH

Fish population samples were taken in Lake Louie in September, 1960, because of reports by many fishermen in the area that a decline in fishing success had been experienced.

The samples revealed that 53.4% of the total weight was shad, 14.7% game fish and 31.9% was commercial fish. These samples were taken after Bayou Louie was impounded.

In 1961 samples were again taken and indicated a drop in the percentage of shad (38%), and in 1963 the samples indicated approximately the same percentage of shad population (35.4%). There was a marked increase in the amount o game fish per acre. In 1961 the samples showe 140 lbs. per acre and in 1963 the value was 45.1 lbs. game fish per acre.

Fisheries Section employees Herman Nugent, Ralph Briggs, Prentiss Porter, and Jim Rhoads weigh measure and record fishes taken by rotenone in a fish population sample.

The only major problem in this lake was a decline in fishing success. This almost invariably happens when an area is impounded and stabilized.

Lloyd Posey, Fisheries Biologist, prepared two alternatives of fluctuating the water levels. Since these recommendations were drawn up prior to the knowledge that a dam was to be placed in the Ouachita River near Jonesville, neither of the plans could be successful.

Further recommendations cannot be made until the completion of the dam in the Ouachita River and its effects on Lake Louie are determined.

OLD RIVER AT BATCHELOR

POINTE COUPEE PARISH

During July and August, 1962, a creel census was conducted on this ox-bow lake to aid in a determination of possible effects of placing a dam at the Mississippi River end of the lake. This proposed low sill dam will reduce water fluctuation during the summer months, thus eliminating the possibility of creating possible changes of altered normal conditions in the lake during this period of the year. The creel census will serve as an index to fishing success prior to creation of the dam.

Fish population samples were taken in August 1962 to determine the composition of the fish population in the lake prior to construction of the dam.

Following construction of the proposed dam, samplings from the fish population and determination of fishing success will be accomplished by personnel of the Louisiana Wild Life and Fisheries Commission.

SPANISH LAKE

IBERIA PARISH

Spanish Lake is a shallow natural lake around which a ring levee has been constructed in order to increase the water depth. It has an area of 1,240 surface acres at 130 feet m.s.l. Water is pumped from the Daigre Canal into Spanish Lake to maintain the water level. Approximately one-third of the lake is timbered and large areas are infested with water hyacinths and alligator weeds.

Initial stocking of Spanish Lake was by natural non-game fish. Fish population samples of July, 1963 indicated approximately 60% of the total fish population was made of non-game fish, principally gizzard shad, bowfin, and german carp.

In September, 1963 the lake was drawn down to allow repair of the ring levee. Following the recommendations of the Louisiana Wild Life and Fisheries Commission, the Spanish Lake State Game and Fish Commission eliminated the existing fish population and restocked the lake. The Lake Commission purchased thirty gallons of fish poison (rotenone) and the Louisiana Wild Life and Fisheries Commission applied this chemical.

Restocking of the Lake began in January, 1964, with fish raised at the state hatcheries. By January, 1965, the fish should have reached a sufficient size to be harvested by the fishermen in this lake.

Gizzard shad on the processing table being weighed and measured.

FISH POPULATION STUDIES LAKES AND OTHER BODIES OF WATER

Conducted in 1962-63

Body of Water	*Parish*	*Type of Sample*
Amite River		Rotenone
Anacoco Lake	Vernon	Rotenone
Bartholomew Lake	Morehouse and Ouachita	Rotenone
Bayou D'Arbonne	Union	Rotenone
Bayou DeSiard	Ouachita	Rotenone
Bayou Francis	Ascension	Rotenone
Bayou Macon Cut-Off	Madison	Rotenone
Black Bayou Lake	Caddo	Rotenone
Black Lake	Natchitoches	Rotenone
Bussey Brake	Morehouse	Rotenone
Cane River Lake	Natchitoches	Rotenone
Catahoula Lake	LaSalle	Rotenone
Chemin-A-Haut-State Park Lake	Morehouse	Rotenone
Cross Lake	Caddo	Seine
Fullerton Lake	Vernon	Rotenone
Horseshoe Lake	Morehouse	Rotenone
Ivan Lake	Bossier	Rotenone
Kepler Creek Lake	Bienville	Rotenone
Lake Bruin	Tensas	Rotenone
Lake Lafourche	Caldwell	Rotenone
Lake Louie	Catahoula	Rotenone
Lake Providence	East Carroll	Rotenone
Lake St. John	Tensas	Rotenone
Old River	Beauregard	Rotenone
Spanish Lake	Iberia	Rotenone
Spring Bayou	Avoyelles	Rotenone
Tew Lake	Catahoula	Rotenone
Turkey Creek Lake	Franklin	Rotenone

CYPREMORT COVE

IBERIA PARISH

KENNETH E. LANTZ
Fishery Biologist

This study was initiated in July of 1959 for the purpose of evaluating the area's utilization by marine game fish for spawning, with special emphasis on speckled trout and redfish. The study area is located in east Vermilion Bay, northeast of Cypremort Point. Monthly sampling includes water chemistry for pH, free CO_2, alkalinity, chloride, salinity, and temperatures; plankton samples; and trawl and trammel net samples for fish. (See photo on this page).

Trammel net samples during 1962 (See Table I) showed redfish frequented the cove during the spring and summer, during which time "ripe" or gravid females were examined on several occasions. Speckled trout did not appear in numbers in the cove until mid-July, at which time most of the females examined were "spent" or had expelled their eggs. Trawl samples during the summer and fall did not produce speckled trout or redfish fry, but numerous croaker, anchovy, and catfish fry were collected by this sampling method. The trammel net and trawl samples of 1961 revealed similar results as this 1962 data.

Fishing success during 1961 and 1962 coincided with the above mentioned data. Speckled trout seldom frequented Vermilion Bay in any numbers until late summer and early fall. Redfish catches were made regularly through the spring and summer, but croakers and sea catfish made up the bulk of the average Cypremort fisherman's catch.

An examination of the water chemistry of Cypremort Cove during 1962 (See Table II) indicates the chlorides and the turbidity of the area varied drastically between the first six months and the last six months of the year. Low chloride and high turbidity condition pre-

Redfish tagged in Cypremort Cove for Iberia Rod and Gun Club fishing rodeo, 1963. Note the plastic "spaghetti" tag embedded in the muscle at the base of the dorsal fin.

Redfish taken from Cypremort Cove by trammel ne in July, 1962.

vailed from January to July and a reverse condition occurred in August and persisted for the remainder of the year. Speckled trout have a minimum chloride preference, as is evidenced by the 1962 as well as 1961 water chemistries of Cypremort Cove.

High turbidity readings in Cypremort Cove as well as Vermilion Bay during the early part of 1962 are indicative of the western drift of muddy Atchafalaya River waters entering this area in association with tidal effects. Muddy water from streams entering Vermilion Bay also contributed to this condition.

As summer drought conditions developed and coastal winds shift, the turbid conditions grad ually drop to less than 25 ppm. It should be note that this shift from fresh, turbid water to saline clear water almost annually occurs in late July.

A fish tagging program was initiated in Ver milion Bay in September, 1963 in conjunction wit the Iberia Rod and Gun Club annual fishin rodeo. To date sixty-two speckled trout, redfish croaker, sheephead, drum, and flounder have bee tagged in the Cypremort area. A more intensifie tagging program is planned during the next bien nium in association with this ecological study t substantiate movements of various game fis species in this coastal area.

Table I
TRAMMEL NET FISH POPULATION SAMPLES
NUMBER OF FISH COLLECTED

January, 1962-November, 1962

(Eleven Samples Recorded, 150 yards net)

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov*
Black Drum	..	..	1	1	..	1	..	..	..	1	1
Spotted Weakfish	..	..	..	..	..	..	1	1	1	..	4
Red Drum	..	..	1	1	1	1	1	..	..	..	2
Southern Flounder	..	..	1	..	..	..	1	..	..	1	..
Sheephead	..	..	1	..	..	1	..	..	..	3	1
Striped mullet	8	21	2	5	1	1	..	..	..	1	..
Largescale menhaden	..	..	3	..	..	..	..	..	2	..	1
Spot	..	..	..	..	..	2	..	..	..	..	1
Croaker	..	..	1	1	..	2	4	1	..	..	..
Sea catfish	..	..	1	..	3	..	1	1	1	2	..
Gafftopsail catfish	..	..	..	1	1	..	..	..	..	..	..
Pinfish	..	..	..	..	..	..	..	..	..	2	..
Atlantic Stingray	..	..	..	1	..	..	..	..	..	..	..
Bull shark	..	..	..	1	..	..	..	..	..	..	..
Alligator gar	..	..	1	1	1	1	..	1	1	1	..
Spotted gar	..	..	..	..	1	1	..	..	..	..	..
Gizzard shad	1	..	1	..	1	..	..	..	..	..	..
Blue catfish	..	1	1	3	..	..	..	..	..	..	..
Smallmouth buffalo	..	..	1	..	1	1	..	..	..	..	..

Table II
WATER CHEMISTRIES

(January, 1962-November, 1962)

	Air	*Water*	*Carb.*	*Bicarb*	*Total*	*pH*	*CO₂*	*Chloride*	*Turb.*
January 25, 1962	71	61	0	117	117	7.9	2.0	3,192	26
March 28, 1962	81	71	0	115	115	8.0	3.5	1,738	85
May 10, 1962	79	80	0	67	67	8.1	3.0	1,375	71
July 10, 1962	87	86	0	63	63	8.0	8.0	881	95
August 28, 1962	95	88	0	60	60	7.8	. .	10,591	–25
September 13, 1962	82	84	0	70	70	7.5	. .	7,585	–25
October 2, 1962	79	77	0	38	38	7.2	6.0	7,340	–25

BLACK BAYOU LAKE STUDY

JAMES T. DAVIS
Fishery Biologist

Black Bayou Lake is a 2500 acre impoundment located in Ouachita Parish near Monroe, Louisiana. This lake is well known for its outstanding bass fishing and large bluegill and redear sunfish. The most picturesque description of this lake is "an old cypress studded brake that has six feet of water over it". The cypress and button willows which thrive in this lake make fishing sometimes difficult but always a delightful challenge. Sunfish weighing over one pound are common. Tackle—busting bass are often hooked.

In 1961 a creel census was started on this lake. As there are only two major landings, fish harvest estimates are very accurate. The data gathered from this lake shows us what can be expected from an outstanding lake in North Louisiana.

The results of the creel census for 1962 and 1963 as shown in Table I, indicates that 80 and 94 pounds of fish per acre were caught respectively. This lake due to its proximity to Monroe, is heavily fished year after year. This heavy fishing is partially responsible for the high harvest of fish in this lake. This indicates that contrary to popular belief, over fishing of a lake is unusual and that heavy fishing pressure usually results in better fishing.

At the present time, there are no immediate plans to attempt any management on this lake. The stabilization of water levels in mid 1964 is expected to cause a decline in the fishery of this lake. Continued creel census will be used to evaluate this change.

Table I

RESULTS OF CREEL CENSUS

	1962	*1963*
Fishermen checked	4,061	3,303
Man hours checked	23,867.50	15,683.25
Fish caught	42,609	29,048
Pounds caught	16,527.1	13,485.2
Fish/hour	1.79	1.85
Pounds/hour	0.69	0.86
Average weight	0.39	0.46
Estimated fishermen	48,880	57,682
Estimated man hours	287,364.75	273,829.50
Estimated fish	513,012	507,178
Estimated pounds	198,986.3	235,451.6

BAYOU DE SIARD STUDY

JAMES T. DAVIS
Fishery Biologist

The City of Monroe uses water from Bayou De Siard, a cut off lake, as its water supply. At 71 feet M.S.L., which is normal pool stage, the lake covers approximately 1200 acres. The old channel portion of the lake averages 12 feet deep in the lower end and less than five feet in the upper third.

This lake under went a reclamation program in 1957 through 1959 for the removal of an excessive shad population. Immediate results were noted and a creel census was initiated to determine the effectiveness of the program. The final year of the census was 1962 and the results are presented in Table I.

As only the lower 700 acres of the lake were censused, the yield of 55 pounds of fish per acre is well above the average for North Louisiana. It should be explained that there are certain limitations in this creel census. An accurate count of those people fishing the lake from private docks was not possible. Therefore, it is probable that the estimated harvest figure is quite low.

Samples of the fish population present in this lake were made using both rotenone and nets. The results of these tests indicate that the shad population in the lake is rebuilding. The long period of low rainfall in 1962-63, has had the effect of an extensive drawdown of this lake. It is expected that this will help to control both the shad and the stunted bluegill population present in the lake. This will be censused and evaluated during the next biennium.

The stabilization of the water level in this lake through the use of pumps is expected to have an adverse effect on the fish population. Plans have not been made at this time to alleviate the possible harmful effects. A management plan will be prepared as a recommendation for minimizing any curtailment of the fish harvest.

Table I

RESULTS OF THE CREEL CENSUS
1962

Fishermen checked	605
Man hours checked	875.50
Fish caught	1,128
Pounds caught	326.3
Fish/hour	1.29
Pounds/hour	0.37
Average weight	0.29
Estimated fishermen	36,645
Estimated man hours	106,270.50
Estimated fish	137,089
Estimated pounds	39,320.1

EXPERIMENTAL TAGGING STUDY

JAMES T. DAVIS
Fishery Biologist
JANICE HUGHES
Fishery Biologist

The use of tags to mark fish for future identification has many purposes. Some of these include marking brood stock, determining age, following movements, and determining stocking success. Most of the fish tags presently in use have drawbacks. Some tags are not easily recognized, others are difficult to apply, while still others may leave sores on the fish. This study is set up to evaluate the various tags in use and to develop and evaluate new types of fish tags.

Tags presently being studied are the strap or jaw tag, the dart tag, the streamer tag, spaghetti tag and a spine tag.

FISH DISEASE STUDY

JAMES T. DAVIS
Fishery Biologist
JANICE HUGHES
Fishery Biologist

The incidence of fish diseases in public waters and private ponds has been under study at the Monroe laboratory for the past three years. Diseases of fish are often secondary infections. Entry to the body of the fish can occur after injury by parasites or mechanical means. For the reason, we attempted to determine not only the nature of the disease, but its original cause.

Two of the more common parasites in Louisiana which are often seen by fishermen are the chestnut lamprey and the anchor worm. The lamprey is of minor importance in the state. It is found in scattered instances, but is not known to have caused extensive losses of fish. The lamprey in Louisiana is a distant relative of the sea lamprey found in the Great Lakes region. When found on a fish, it resembles an eel-like animal without legs. It swims in the water through undulations of the body similar to a snake. When found on a fish, it is usually fastened by a sucking disc which contains many hooks. The usual size is from 6 to 14 inches and from ½ to 1 inch in diameter.

The anchor worm resembles a small white worm which is less than one inch in length. When first seen by the fishermen, it is usually sticking out of the flesh around the dorsal or top fin. In severe infestations, serious damage to fish can occur. Usually this is caused by a secondary infection such as fungus. Treatment for this parasite in most lakes and streams is not economically practical. In small private ponds, treatment is usually done through the use of the gamma isomer of BHC. Further information on the treatment of these parasites is available upon request.

Several other fish parasites are of local importance throughout the state. Space does not permit a discussion of all of these. Therefore one general statement should be of interest to the fisherman. No cases have been reported in Louisiana of a fish parasite being transferred to a man.

Some of the more common diseases of fish have been studied during the past year. The disease most often noticed by fishermen, farmers and fish growers is fungus. This disease is usually a secondary infection and effective control is dependent upon removal of the causative factor. Reasonable control of fungus has been obtained through the use of malachiti green, methylene blue, congo red or acriflauine. An accurate description of fungus can be found in any book dealing with fish diseases. To the layman, fungus appears as a white or grayish, hairy growth which can appear at various places on the fish.

Another common fish disease is called fin and tail rot. This appears as frayed and reddish fins. The tail fin is most often affected and is the most noticeable. Effective control of this disease has been achieved through the addition of axytetracycline (Terramycin) to feed. This disease is often found in small ponds and may be quite destructive to the fish population.

Various other fish diseases both of viral and bacterial origin have been under study. Due to the difficulty in recognizing these diseases treatment should be handled only after a careful diagnosis. For this reason, any further information desired should be requested from the nearest district office.

COMMERCIAL FISH PRODUCTION STUDY

JAMES T. DAVIS
Fishery Biologist
SAMMY STOKES
Fishery Biologist

Seven kinds of fish have been studied at the Monroe hatchery and in the surrounding area for several years. Talapia were found to be unable to withstand the cold in north Louisiana and were subsequently discarded. Israeli carp and brown bullheads have received some attention but as yet no recommendations have been formulated. Channel catfish, golden shiner, buffalo and crawfish all have been found to be commercially profitable. Some recommendations on these will be given.

Israeli carp have been suggested as one method of controlling aquatic vegetation in ponds. Experiments in the Monroe hatchery have tended to indicate that this is not advisable. Weed control has been achieved only when high populations are present. When such is the case, the water is so roiled and muddy that fishing is impossible. For this reason, the addition of these fish to a pond for weed control is not recommended. Commercial growing of these fish may be feasible, but pilot studies in Louisiana are inconclusive at the time.

Brown bullheads have been studied for over four years. At this time, there is no basis for recommending them for commercial growing in Louisiana.

The production of crawfish for commercial markets is very new in the Monroe area. From data obtained through observation of two commercial ventures, it is apparent that profitable production is possible. More research is mandatory before the average land owner should consider this as a stable economic crop.

Buffalo fish production has been attempted on a small scale by various farm operators in this area. Success has been varied but generally poor. Reasons for this failure have been almost as varied as the personnel operating the fish farms.

Two major reasons are immediately apparent, lack of knowledge and a poor market.

The commercial production of minnows is a well established business in most of north Louisiana. Some farmers raise minnows for their own use and the use of their friends. Actual commercial production on a profitable scale is highly competitive business. In addition the product is very perishable. Before anyone should start to raise minnows for sale, a thorough study of market conditions, demand, soil and water type and availability should all be given an extensive investigation. There is still a place for more growers in this state. Local conditions make minnow production impractical in most areas of the state.

Channel catfish growing is receiving increased attention over much of the state. The market is good, the profit/cost ratio fair and the future is promising. Initial costs are high and some knowledge of fish is required.

Construction of ponds for growing fish for commercial sales requires careful planning. An area in the pond for the removal of the crop must be made. In addition, facilities for draining the pond completely are necessary. Both of these are important if fish are to be harvested in time to reach a peak market. The difference in selling at the right time may mean the difference between profit and loss. Average prices vary from 20 to 30 cents per pound.

One of the costs in the production of catfish is the purchase of the fingerlings annually. Prices in Louisiana vary from 5 to 10 cents each depending on the quantity and size involved. It is not recommended that fingerlings be raised by individual growers. Considerable knowledge is required for successful spawning of catfish and success ratios are not high.

The fingerling catfish are put in ponds of one to five acres in late fall. Feeding is started immediately and then curtailed during the winter months. Various feeds are used with commercially prepared fish foods being the most common. The catfish grow quite rapidly and with heavy feeding average from ½ to 1½ pounds by September of the following year.

The yield of fish which can be expected per acre varies according to the stocking rate and amount of feed used. About 300 pounds of fish can be grown per acre without artificial feeding. If fingerlings are stocked at the rate of 2000 to 2500 per acre, with heavy feeding, yields of 1500 to 2000 pounds per acre are normal. At these high rates of production, profits vary from 50 to 150 dollars per acre per year.

The future of catfish raising in Louisiana is bright. More technical knowledge and assistance is necessary. As the market develops, Louisiana should gradually become one of the highest producers of commercial fish.

ATCHAFALAYA BASIN FLOODWAY

The Atchafalaya Basin is a vast, scenic, semi-wilderness area, highly productive of fish and wildlife. Work presently being considered by the U. S. Corps of Engineers in the lower portion of the basin includes enlargement of the Atchafalaya River channel by dredging, closure of distributary channels and the extension of the Atchafalaya River levees to confine floodwaters to the extent practicable. This proposed work would have tremendous detrimental effects on the commercial and sport fisheries of the Basin and has become extremely controversial. Therefore, the Louisiana Wild Life and Fisheries Commission conducted a short term intensive survey to evaluate the commercial and sport fisheries of the Atchafalaya Basin Floodway.

The Atchafalaya River is the major distributary of the Mississippi River. Old River which flows out of the Mississippi River joins Red River to form the Atchafalaya River. The river then flows a distance of approximately 140 miles to Atchafalaya Bay, an arm of the Gulf of Mexico. The Atchafalaya River was formed during very recent geological times. The river was a minor drift-choked stream until about 1900. Since then developments for navigation and flood control have aided a natural tendency for the river to enlarge and to convey even larger quantities of Mississippi River flow during ordinary and low water stages. The river has enlarged itself to such an extent that some 30 percent of the total annual Mississippi River flow is now diverted down its channel. A control struction put in place during 1963 will prevent further increases in the diversion of Mississippi River flow.

The leveed Atchafalaya Basin consists of 860,000 acres of alluvial bottom land. There is also 422,400 acres of coastal marshland south of Morgan City associated with the Atchafalaya River. Because of the construction of levees, the basin north of Krotz Springs does not annually overflow and is relatively unimportant as a fish and wildlife area. The 562,000 acre Atchafalaya Basin Floodway, *i.e.*, the portion of the basin between Krotz Springs and Morgan City, annually overflows and is extremely productive of fish and wildlife.

The Atchafalaya Basin Floodway is dissected by an intricate system of large numbers of shallow lakes of various shapes and sizes, bayous, sloughs, distributaries, and canals. During the annual periods of high water in the Atchafalaya River, practically the whole Atchafalaya Basin Floodway overflows. Most high water stages occur during late winter, spring and early summer, however the depth and duration of overflow varies from year to year. The high production of aquatic organisms in the area is dependent upon this annual water cycle of flooding the land during part of the year and annually de-watering large areas, except the permanent pools.

The Atchafalaya Floodway Basin has remained largely a wild overflow forest and swamp land. It supports a very extensive flora and fauna.

An intensive short term creel survey was conducted from May 11 through 19, 1963. Eighteen stations were maintained from 7 a.m. through 9 p.m. All persons, cars, etc., leaving the floodway were stopped and asked if they had been sport fishing in the Atchafalaya Basin Floodway. If so, their catches were examined and pertinent data recorded on standard creel survey forms. No data were obtained on the weights of the fish caught, and it was not possible to count the number of crayfish caught by the sport fishermen. Estimates of the sport fishing occurring during the nine days were made for each checking station.

During the nine days, there were 17,723 man-days of fishing (other than sport crayfishing) and 200,168 fish caught or 11.29 fish per trip. The quality of the fishing was exceptional. There were 267 man-days of fishing for crayfish making a total of 17,990 man-days of sport fishing. The catch was composed of 137,772 sunfish, 28,497 crappie, 16,840 bass, 13,974 catfish, 191 striped bass and 2,894 other fish.

The fishing pressure was the highest on the west side of the Atchafalaya Basin Floodway where there were 10,811 man-days of fishing and 136,347 fish caught. On the east side there were 7,179 man-days of fishing and 63,821 fish caught. The catch rate was 12.65 fish per trip on the west side while 9.20 fish per trip were caught on the east side. The catch of sunfish and crappie was the highest on the west side with 97,736 and 25,892 fish being caught respectively, while there were 40,036 sunfish and 2,605 crappie caught on the east side. The catch of bass and catfish was the highest on the east side with 10,373 and 9,004 fish being caught respectively, while there were 6,467 bass and 4,970 catfish caught on the west side.

The man-days of fishing at the various check stations varied from 107 to 5,429 man-days. The catch per trip was high at all check stations. It is believed that the differences in man-days of fishing, number of fish caught, and the composition of the catch at the various check stations are due primarily to local preference of the fishermen rather than differences in the fish population.

The Atchafalaya Basin Floodway offers good fishing for most of the freshwater fish associated with the warm waters of the south, including largemouth bass, spotted bass, black crappie, white crappie, white bass, bluegill, redear sunfish, warmouth, channel catfish and blue catfish.

Largemouth bass are abundant throughout the Atchafalaya Basin Floodway including the back swamp lakes, bayous, sloughs, distributaries canals, and the main river channels and lakes Spotted bass are taken in quantity throughout the area, however largemouth bass predominate in the catch. Spotted bass appear to reach their greatest abundance in those bodies of water which maintain some flow of water throughout the year. In such areas, catches of bass consisting entirely or almost entirely of spotted bass are common.

Many of the more remote waters of the floodway are fished almost solely for bass, even though other species are abundant. Sport fishermen have discovered in recent years that exceptionally good bass fishing is available in the main channel and major distributaries of the Atchafalaya River and in the Six Mile Lake segment of the Atchafalaya Basin Floodway. Surprisingly good catches of bass are often made in some areas during low water periods when the water is exceptionally turbid.

Both the white and black crappie are common in the area, however black crappie seem to be more abundant.

All species of sunfish common to Louisiana occur in the floodway, however bluegill, redear sunfish and warmouth compose most of the catch. In certain areas and at certain times of the year, warmouth are the principle sunfish caught. Large catches are often made casting, while the other species of sunfish are caught in a conventional manner. The predominance of warmouth in some areas probably can be explained by their ability to utilize the abundant supply of crayfish for food and their ability to survive in habitats having low concentrations of dissolved oxygen which are unfavorable to most other species of game fish. During high water periods, localized areas of the floodway will often have low dissolved oxygen concentrations due to the rapid decay of vegetation. In these areas, large catches of warmouth are often made, while the other sport fishes have either left such areas or because of distress due to low oxygen concentrations are not feeding.

White bass are common throughout the floodway, however they appear to be extremely migratory. Generally, white bass are abundant in the lakes and bayous remote from the main channels and distributaries during high water periods and evidently leave such areas during low water periods. In the main channels and distributaries, and the Six Mile Lake segment of the floodway, they are abundant throughout the year. Even though large catches of white bass are possible, especially when they are schooling and feeding on the surface, relatively few are harvested. Most fishermen of the area prefer largemouth and spotted bass and do not fish for them.

Catfish are not normally considered a sport fish in south Louisiana; however, a considerable sport fishery appears to be developing for them in the Atchafalaya Basin Floodway. Probably this is due to the high esteem in which they are held as a food fish and the ease with which large catches can be made in the floodway. Sport catches are made by pole fishing and with trot line. Channel catfish predominate in the catch, however blue catfish are common.

Considerable sport fishing for crayfish occurs in the Atchafalaya Basin Floodway, however it is limited to the spring and early summer months. During high water stages, when the water is backed up on the floodway levees, considerable sport fishing for crayfish is done with drop nets baited with fish or meat of some type. Sport fishermen also use the standard crayfish trap and these are fished in relatively deep water.

Considerable sport fishing used to occur in the many lakes and bayous located in the West Atchafalaya Basin Floodway and Morganza Floodway. However, because of the construction of levees along the Atchafalaya River, these areas no longer receive the overflow and the sport fishing pressure is now relatively light. With the extension of levees along the Atchafalaya River and the damming of the distributaries, sport fishing has gradually moved further and further down the basin. The extensions of levees has adversely affected the sport fisheries in the extreme northern section of the Atchafalaya Basin Floodway.

SURVEY OF COMMERCIAL FISHERIES

The U. S. Fish and Wildlife Service in 1959 estimated that 3,600,000 pounds of commercial fish, frogs, crayfish, river shrimp, and turtles valued at approximately $900,000 are harvested during an average year by about 1,300 licensed fishermen from the Atchafalaya Basin. The Louisiana Wild Life and Fisheries Commission in 1962 estimated that the basin annually contributes 40 percent of the state's freshwater commercial fish harvest. During the fiscal year 1955, it was estimated that the harvest of freshwater commercial species was 4,923,400 pounds valued at $1,208,336. The U. S. Fish and Wildlife Service in 1963 determined that the Atchafalaya Basin Floodway produced 6,764,700 pounds of commercial fish returning to the fishermen $902,613 during 1955; 6,055,600 pounds returning $937,828 during 1957; 7,822,500 pounds returning $1,239,823 during 1958; 7,391,100 pounds returning $1,179,646 during 1959; 5,964,800 pounds returning $950,383 during 1960; and 6,954,000 pounds returning $1,190,121 during 1961.

It is readily seen that an extensive commercial fishery occurs in the Atchafalaya Basin Floodway, however there were still considerable gaps in our knowledge of this fishery. Therefore, a short term intensive survey was conducted during February and March of 1963 to evaluate this fishery. This consisted of a survey of licensed commercial fishermen, a survey of retail fish dealers, a survey of wholesale fish dealers, and a survey of non-license commercial fishermen who had a motor boat license. The samples for the surveys were drawn from various 1962 license registrations.

During 1962, there were 419 licensed commercial fishermen utilizing the Atchafalaya Basin Floodway. These fishermen harvested 5,300,489 pounds of aquatic organisms from the Atchafalaya Basin Floodway during 1962 returning $732,706. There were 1,179,099 pounds of buffalofish; 1,089,127 pounds of catfish; 763,146 pounds of crayfish; 661,013 pounds of freshwater drum; and 660,964 pounds of garfish harvested. These fishermen sold 144,507 pounds or approximately three percent of their catch to non-licensed buyers. Retail fish dealers from the parishes in the vicinity of the Atchafalaya Basin Floodway were surveyed.

During 1962, there were 112 retail dealers buying fish from the Atchafalaya Basin Floodway. They purchased fish from 501 fishermen, however this is a maximum estimate of the number of commercial fishermen, as more than one retail dealer could buy fish from an individual fisherman. These retail dealers during 1962 bought 3,990,980 pounds of aquatic organisms from the Atchafalaya Basin Floodway valued at $653,214.

During 1962, there were 41 wholesale dealers buying fish from the Atchafalaya Basin Floodway. They purchased fish from 1,213 fishermen, however this was a maximum estimate of the number of commercial fishermen, as more than one retail dealer could buy fish from an individual fisherman. These wholesale dealers bought 11,039,793 pounds of aquatic organisms from the Atchafalaya Basin Floodway valued at $1,974,723.

During 1962, these dealers bought over 15 million pounds of aquatic organisms valued at $2,627,000. Crayfish lead in production with 5,089,000 pounds; followed by 4,876,000 pounds of catfish; 1,721,000 pounds of buffalofish; 1,188,000 pounds of freshwater drum; 439,581 pounds of nutria meat; 413,000 pounds of garfish; 319,000 pounds of blue crab; 227,000 pounds of bullheads; 224,000 pounds of turtles; 182,000 pounds of baby turtles (or 9 million baby turtles); 159,000 pounds of carp; 113,000 pounds of bullfrog; 86,000 pounds of bowfin; and 17,000 pounds of river shrimp.

The catch of catfish returned the commercial fishermen the most money and was valued at

$1,150,000; followed by crayfish valued at $911,000; buffalofish valued at $179,000; freshwater drum valued at $114,000; baby turtles valued at $69,000; bullfrog valued at $48,000; turtles valued at $40,000; bullheads valued at $31,000; garfish valued at $26,000; blue crabs valued at $21,000; and nutria meat valued at $20,000.

The commercial fishing boat license registration for the parishes of Assumption, St. Martin, St. Mary, Iberia, Iberville, St. Landry and Pointe Coupee was checked against the commercial fishing license registration for these parishes. In these parishes there were 1,021 fishermen who had a commercial fishing boat license and no commercial fishing license.

During 1962, there were 803 commercial fishermen with a commercial fishing boat license but with no commercial fishing license utilizing the Atchafalaya Basin Floodway. These fishermen harvested 6,946,350 pounds of aquatic organisms from the Atchafalaya Basin Floodway valued at $1,224,404. There were 3,061,000 pounds of catfish; 1,226,277 pounds of crayfish; and 1,313,869 pounds of blue crab harvested.

The commercial fishery for crayfish is peculiar to Louisiana. It is seasonal, being limited almost entirely to the spring and early summer months. Almost all of the commercial catch is taken in traps constructed of 3/4 inch poultry wire baited with fish or meat of some type. These traps are fished in deep water, sometimes in water of depths of 15 or 20 feet or more, during the overflow periods in the Atchafalaya Basin Floodway. Crayfish from the area are relatively large, sometimes running 6 to the pound. All of the commercial catch is sold for human consumption.

The commercial catch of catfish consists of three species, channel, blue and flathead catfish. However, channel catfish seem to predominate in the catch. A considerable portion of the total production is taken on trot lines, however many are taken in hoop-nets.

Buffalofish, freshwater drum, garfish, are harvested mainly with gill nets, trammel nets, seine, and hoop-nets and these fish are sold mainly for human consumption. Nutria meat is shipped mainly to the northern and western states for use as mink food, while baby turtles are sold as pets and novelties. Blue crabs are caught mainly on trot lines. River shrimp are taken mainly in small baited wire traps and are sold mainly for human consumption.

An extensive commercial fishery used to occur in the many lakes and bayous located in the West Atchafalaya Basin Floodway and Morganza Floodway. However, since the construction of levees along the Atchafalaya River, these areas are relatively unimportant for the production of commercial aquatic organisms. Presently, most of the commercial fishing in the basin is concentrated in the Atchafalaya Basin Floodway. The extension of the levees has also adversely affected the commercial fishing in the extreme northern section of the Atchafalaya Basin Floodway.

Even though 15,030,773 pounds or 27 pounds per acre of commercial aquatic organisms were produced in the 562,000 acre Atchafalaya Basin Floodway during 1962. It is believed that the potential for greatly increasing the commercial harvest is good under the present conditions existing in the floodway. Many of the species of fish in the area are under-exploited. The production of crayfish could be increased substantially, simply by increasing the fishing pressure on them during the times of the year when they are available. The catch of such fish as bowfin, bullheads, freshwater drum, etc., could be increased. The take of nutria meat could be expanded greatly. Mullet, even though it is one of the most abundant of all species of fish in the Atchafalaya Basin Floodway is almost completely unexploited. Yet, this same fish is one of the most valuable food fish in the south. Markets need to be developed for this species. No data are available on the rate of exploitation of catfish in the area, and since the catch is rather high, it is not known whether or not their exploitation could be increased substantially.

Depending upon conditions in the Atchafalaya Basin Floodway, exceptionally large catches are often made in relatively short periods of time. This results in the market becoming glutted and the fishermen either find it difficult to sell their catch or have to sell it at reduced prices. The process of marketing the commercial catch from the Atchafalaya Basin Floodway is in urgent need of study and modernization. If this is done, and markets for the under-exploited species are developed, the commercial production of aquatic organisms in the Atchafalaya Basin Floodway should in the future increase greatly, assuming that the present ecological conditions existing in the basin are maintained.

FROM LAKE PROVIDENCE TO VENICE!

The most spectacular fish mortality ever noted in the state of Louisiana, one which was to demand a great part of the time of several of the staff members of the Louisiana Wild Life and Fisheries Commission for months, and result in the loss of untold tons of fish, started with the report of a fish die-off in the Atchafalaya River near Krotz Springs on November 27, 1960. This was rapidly followed by reports of fish die-offs from widespread areas in the Mississippi River and the Atchafalaya River Basin. Ultimately mortality was noted in the Mississippi River from Lake Providence to Venice and in the Atchfalaya drainage from Old River to Morgan City. Approximately 95% of the fish that died were catfish.

ESTIMATED MAN-DAYS OF FISHING AND THE NUMBER OF FISH CAUGHT

	Man-days of fishing other than crayfishing	Fish caught by sport fishermen other than sport crayfish fishermen							Man-days of crayfishing	Total man-days of fishing	Number of fishermen checked
		Bass	Crappie	Sunfish	Striped Bass	Catfish	other fish	Total			
East Side											
Number	6,941	10,373	2,605	40,036	117	9,004	1,686	63,821	238	7,179	5,514
Number per trip	....	....	....	....	....	....	....	9.20	...	....	....
West Side											
Number	10,782	6,467	25,892	97,736	74	4,970	1,208	136,347	29	10,811	7,337
Number per trip	....	....	....	....	....	....	....	12.65	...	....	....
TOTAL											
Number	17,723	16,840	28,497	137,772	191	13,974	2,894	200,168	267	17,990	12,851
Number per trip	....	....	....	....	....	....	....	11.29	...	....	....

ESTIMATED MAN-DAYS OF FISHING AND THE NUMBER OF FISH CAUGHT

By Check Station Locations

Check Station Location number	Man-days of fishing other than cray-fishing	Fish caught by sport fishermen other than crayfish fishermen								Man-days of Cray-fishing	Total man-days of fishing	Number of fisher-men checked
		Number							Total Number per Trip			
		Bass	Crappie	Sunfish	Striped Bass	Catfish	Other Fish	Total				
1	301	274	18	2,106	..	262	...	2,660	8.84	...	301	146
2	134	237	9	729	..	49	5	1,029	7.68	1	135	106
3	1,401	5,693	483	8,837	11	549	181	15,754	11.24	17	1,418	1,125
4	720	1,144	211	1,362	15	2,620	80	5,432	7.54	129	849	655
5	592	316	46	2,392	18	1,451	76	4,299	7.26	72	664	525
6	2,961	1,667	554	18,172	53	3,747	394	24,587	8.30	13	2,974	2,516
7	179	157	6	1,804	..	115	9	2,091	11.68	6	185	130
8	653	885	1,278	4,634	20	211	941	7,969	12.20	...	653	311
9	3,182	1,153	16,781	16,381	3	322	263	34,903	10.97	...	3,182	2,253
10	129	20	65	553	..	80	65	783	6.07	3	132	60
11	5,429	3,187	7,964	69,633	60	3,571	128	84,543	15.57	...	5,429	3,848
12	283	283	203	1,415	2	314	35	2,252	7.96	3	286	212
13	298	583	404	1,810	0	131	18	2,946	9.89	3	301	204
14	222	761	270	2,380	2	193	353	3,887	17.51	1	223	160
15	96	59	9	353	7	30	12	470	4.90	11	107	56
16	278	96	0	394	0	106	16	612	2.20	8	286	143
17	457	232	96	2,830	0	64	189	3,411	7.46	...	457	211
18	408	93	100	2,059	..	159	129	2,540	6.23	...	408	190

DINGELL-JOHNSON PROJECT F-7-R

Investigations of Fish Management Practices

JAMES T. DAVIS
Fishery Biologist
JANICE S. HUGHES
Fishery Biologist

Continued good fishing in lakes and reservoirs in the state is one of the primary objectives of the fisheries section. Research toward the accomplishment of this objective is assigned to this project. Data dealing with many factors which affect fishing success are being collected and evaluated. At present the major areas of study include the evaluation of certain management procedures, effects of standing trees on the population and harvest of fish, economic impact both local and area wide of an impoundment, water level fluctuation and the potential fish harvest of a new lake in Louisiana.

Major efforts of this project are centered on three lakes in northeast Louisiana.

BUSSEY LAKE

Bussey Lake is a 2200 acre lake located near Bastrop, Louisiana, in Morehouse Parish. International Paper Company constructed the lake in 1958 to provide an emergency freshwater supply for their Bastrop mills. Since the company was interested in developing the lake for maximum recreation, a cooperative fish management program was initiated with the Louisiana Wild Life and Fisheries Commission. The generally circular lake has a shoreline of approximately eight miles. Trees were left standing in the lake to reduce wave action. These trees consist of a band, 150 yards wide, that encircles the lake 100 to 600 feet from the levee. The average depth of the water is eleven feet which killed the trees after the second year.

Fish were stocked by the Commission in January 1959. Largemouth bass, bluegill, black crappie and channel catfish were stocked. On April 30, 1960, the lake was opened to public fishing. Due to the washing of the levee caused by high speed operation of large outboards, only electric trolling motors were permitted after May 16, 1960.

Economic Impact

The effect of this lake on the economy of the Bastrop area has been studied to a limited extent. Results have encouraged intensive efforts in the future. The change in motors permitted on Bussey Lake offered an excellent opportunity to check the extent of the effect of the fisherman on the economy.

Fisheries personnel inventoried the retail outlets in Monroe and Bastrop, Louisiana, with astonishing results. In Monroe, eleven electric trolling motors were sold between May 1, 1959, and May 1, 1960. From May 16, 1960, through June 30, 1960, seventy-five electric trolling motors were sold. In Bastrop the difference was even more pronounced. Between May 16 and June 30, 1960, fifty-three electric motors were sold while only two were sold during the preceeding twelve months. Most of these motors sold in excess of $100.00 each which indicates a sizable contribution to the local economy.

A check on the sales of boats and boating equipment failed to give accurate appraisal. A check of the boats docked on the lake revealed that over 450 boats were docked on the lake on June 30, 1960. Many of these boats were new.

Sales of fishing licenses also give an indication of the usage of the area. This can in turn show how a lake affects the economy. Fishing license sales show the following interesting trends in Morehouse Parish. Prior to 1959, license sales averaged approximately $1,700. License sales for Morehouse Parish for the following four years were:

Year	*Amount Sold*
Prior to 1959	$1,700.00*
1959—1960**	2,872.00
1960—1961	3,305.00
1961—1962	3,603.00
1962—1963	3,722.00

*Approximately.
**Bussey Lake opened April 30, 1960.

A check of the Morehouse Parish records indicated that the major license sales increases were for non-resident annual and non-resident trip licenses.

All of these factors show that the economy of an area is favorably affected by the construction of a lake.

Creel Census

To determine the harvest of fish from this lake, a creel census was initiated. Seven days per month are censused. On these days a count is made of every fisherman entering the lake. As many catches of fish as possible are checked by the creel clerks. This method of creel censusing enables us to accurately determine the total harvest of fish.

On Bussey Lake an estimated 160,946 fishermen used the lake between April 30, 1960, and April 30, 1963. An additional 88,500 fishermen have used the lake from April 30, 1963, through October 30, 1963. For more details, the reader is referred to Table I.

Though only 4 species of fish were stocked in the lake, 23 species have been found in the creel. Netting in the lake has indicated that least 5 other species are present.

Largemouth bass were the most sought after fish during the first year and over half the pounds of fish caught were bass (Table 2). By the end of the third year, this had diminished to the point that less than one-fifth of the pounds creeled were largemouth bass. The average size of the bass creeled during the three year period increased from 1.07 pounds to 1.63 pounds. This makes them a more desirable fish, but apparently they have become much more difficult to catch.

Bluegill were the most frequently found fish in the creels of fishermen from Bussey Brake Reservoir for both the first and third years. The other sunfish present occupied a diminishing portion of the creel. The average weight of the bluegill checked increased only slightly during the three year period from 0.33 to 0.35 pound.

Crappie fishermen were most prevalent in the second year and the weight of those caught for this year exceeded 45 percent of the total creel.

During the first year, the miscellaneous fish portion of the creel exceeded 10 percent. During the third year this dropped to approximately 4 percent of the total pounds.

Fisherman Effort

As each fisherman's creel was checked, he was questioned to determine the kind of fish he was attempting to catch and the bait he was using. This information in addition to the number of hours spent fishing was used to determine the catch per hour for each type of fish and the relative success of different fishing methods.

During the first year the lake was opened to fishing, 20,824.75 hours were spent, by fishermen checked, fishing for bass. This is 47.4 percent of the total hours checked. During this period, bass fishermen averaged 0.95 bass per hour. This catch per hour declined to 0.58 bass per hour in the second year and 0.43 bass per hour in the third year. During both of the latter years, slightly over 20 percent of the fishermen hours checked were spent fishing for bass.

Crappie fishing was slow to develop in this lake. Slightly over 17 percent of the fishing effort expended during the first year was on crappie fishing. This increased sharply during the second year when 42.4 percent of the anglers' time was spent crappie fishing. The catch per hour increased from 2.1 to 3.0 crappie per man hour during the second year. During the third year, the catch dropped to 1.2 crappie per man hour and the fisherman affort dropped to 34 percent of the total time. The major portion of the third year produced very poor crappie catches. Late in February 1963, as the lake was returning to its normal pool stage, fishing effort for crappie increased markedly. By the end of April, crappie fishermen outnumbered all others combined.

The sunfish population in Bussey Brake Reservoir provided excellent fishing throughout the three year period. The percentage of the fisher-

Table 1

SUMMARY OF CREEL CENSUS DATA
1960-1963

	April 1960-April 1961	*May 1961-April 1962*	*May 1962-April 1963*	*April 1963-October 1963*
Number fishermen checked	11,218	8,702	4,242	4,186
Number man hours checked	43,980.25	34,685.00	18,710.75	19,752.0
Length fishing trip	3.93	3.99	4.41	4.72
Number fish checked	85,703	79,543	30,782	34,591
Number pounds checked	45,606.9	29,685.8	15,520.2	14,898.6
Number fish per hour	1.95	2.29	1.65	1.75
Number pounds per hour	1.03	0.86	0.83	0.75
Percent successful	85	81	79	....
Estimated number fishermen	55,872	59,172	45,902	88,476
Estimated number man hours	223,097.25	239,315.75	201,284.50	417,606.7
Estimated number fish	416,552	555,806	352,826	730,812
Estimated number pounds	211,364.0	205,486.0	175,511.5	314,886.1
Number man hours per acre	101.41	108.78	91.49	189.82
Number fish per acre	189.34	252.64	160.38	332.19
Number pounds per acre	96.07	93.40	79.78	143.13

Table 2

COMPOSITION OF CATCH OF FISH
1960-1963

	1960-1961			*1961-1962*			*1962-1963*		
Class	*Fish*	*Pounds*	*Avg. Wt.*	*Fish*	*Pounds*	*Avg. Wt.*	*Fish*	*Pounds*	*Avg. Wt.*
Bass	21,786	23,327.0	1.07	4,881	5,787.3	1.19	1,900	3,101.8	1.63
Crappie	19,050	5,111.4	0.27	45,720	13,094.2	0.29	8,295	4,652.2	0.56
Bluegill	29,986	9,854.1	0.33	26,164	9,148.3	0.35	19,331	6,773.4	0.35
Other sunfish	10,107	2,041.2	0.20	1,958	531.4	0.27	753	295.4	0.39
Miscellaneous fish	4,774	5,273.2	1.10	820	1,124.6	1.37	503	697.4	1.39
Total	85,703	45,606.9	0.53	79,543	29,685.8	0.37	30,782	15,520.2	0.50

men's time spent attempting to catch sunfish increased steadily from 33.4 percent in the first year to 43.6 percent in the third year. The catch of sunfish per hour remained relatively high, varying from 2.18 to 2.63 fish per hour. The most sought after Sunfish was the bluegill and the catch of other sunfish incidental.

The catfish fishery on Bussey Brake Reservoir has failed to develop during this three year period. During the first year, yellow bullheads (*Ictalurus natalis*) and black bullheads (*Ictalurus melas*) comprised 1.6 percent of the fishing time. As the bullhead fishery declined and the channel catfish stocking failed to produce a fishable population, less than 1 percent of the fishermen's time was spent in the pursuit of catfish.

As each new lake is opened to public fishing in Louisiana, many people rush to try their luck. During the first 5 days of fishing on Bussey Brake Reservoir, an estimated 3,380 fishermen caught 38,194 fish. After this initial period of intensive fishing, the number of people using the lake declined. It is evident, however, that due to the good fishing available, fishermen are continuing to fish this lake. Other lakes in the state, if taken under proper management, could also produce comparable catches of fish.

Water Level Fluctuation

Early in 1960, the project leaders noted a rapid increase in aquatic weeds in Bussey Lake. This problem developed rapidly until the summer of 1960. By this time it was readily apparent that something had to be done or fishing would be impossible by 1963.

During the summer of 1960, studies were started to determine what chemicals, if any, would control this weed problem. Three chemicals were available on the market that would control the weeds present. Estimates of cost varied from $31,000 to $300,000. For this reason, chemical control was deemed impracticable.

The project leaders studied the aquatic weeds present and determined that the major problems were two species. These were narrow leaf pond weed (*Potamogeton sp.*) and southern naiad (*Najas quadalupensis*). Both of these weeds can sometimes be controlled through water level fluctuation. Based on this premise, we recommended that the lake be drawn down eight feet from normal pool stage.

Due to the possible need of the paper mills for water, the drawdown was not started until October 28, 1962. By this time, evaporation had already lowered the lake three feet. The gates were opened and the lake drained down an additional five feet. The drawdown was completed in December and the gates closed on December 31, 1962.

While the water was drawn off the weed infested flats, the plants were subjected to both dessication and freezing. At least two days of this time, temperatures were below zero.

Pumps were started to refill the lake beginning on February 26, 1963. The water was pumped from Bayou Bartholomew into the lake. Due to low water levels in the bayou, pumping was extremely slow and it was May 25, 1963 before the lake again reached pool stage.

Several desired effects of this drawdown have been realized. The aquatic weed problem was reduced over 98 percent. By late fall 1963, less than 30 acres had been reinfested. This in itself was a distinct boon to the fisherman. This can be noted in the increased number of fishermen using the lake.

Two major changes were made in the fish population through this drawdown. Prior to the drawdown a tremendous number of small crappie had been noted in fish population samples. Due to the low water levels crappie spawning was reduced. As a result, the remaining crappie in the lake made excellent growth.

Another effect on the fish population was that the low water levels crowded the small bluegill and small shad into the deep water areas where bass and crappie could prey on them. Rotenone sampling during the summer of 1963, showed that this was very successful. The small shad had been removed from the population and the bass and crappie increased in weight.

Further studies will be conducted using winter drawdown as a management tool. It should be remembered that this is just one of the tools that a fisheries biologist can use in the management of a lake.

Limnological Investigations

The limnology of a lake is made up of many factors. Some of these include benthos, plankton and water quality. To the average fisherman this means very little. If we say that we are studying those things which affect fish production, then it is more meaningful. Often we are able to tell many things about a fish population from the location and amount of fish food present.

Benthos includes all bottom dwelling organisms. The main benthic organisms in which we are interested as fish food are immature insects. These are often seen by the fisherman on rotten sticks in the water. Usually he calls them "little red worms". These along with mosquito larvae, snails and mussels are the major foods of sunfish, catfish and many other fish.

Benthos populations in Bussey Lake have been extremely high. The drawdown had the effect of actually increasing the benthic organisms per square foot of bottom mud. This will probably be reflected in an increase in the sunfish harvest in the lake.

Water quality studies often give a key to the productivity of a lake. Of particular interest is the amount of nitrogen and phosphorus present. Other chemicals may affect the productivity but to a more limited extent. The amount of nitrogen and phosphorus in the lake has remained high throughout the study. Tannins and lignins which are released from green trees and leaves during decomposition give the lake a dark brown or black color. These are also present in this lake.

Dissolved oxygen in the water is also very important to fish. A record of this is kept on Bussey Lake at all times. The acidity which is expressed as pH units is also of interest in fish production. On Bussey Lake the water has remained near neutral (pH 7.0) since the lake was completed.

The study of limnology is often misunderstood and mistrusted by the average fisherman. As has been pointed out, these factors of fishery biology have a definite effect on both fish production and fishing success. In managing a lake, the fisheries biologists must take into consideration all of these factors.

D'ARBONNE LAKE

D'Arbonne Lake is a recently completed impoundment of approximately 15,000 acres. This lake, located in Union and Lincoln Parishes, was made possible through Act Number 9 of the Louisiana Legislature of 1956. Farmerville, Louisiana is located on the bank of the lake, six miles above the dam. Pool stage of the lake will be 80 feet MSL and will exceed 15 miles in length. The lake will be relatively shallow with an average depth of about 8 feet and a shoreline of over 100 miles.

Access to the area is provided through Louisiana Highways 2, 15 and 33. The land around the lake is primarly timber land. Predominate types are loblolly-short leaf pine and oak-pine types. Public access to the lake will be assured through the purchase of park sites scattered over the lake area. Boat launching ramps will be installed at the point where all major highways cross the lake and at most of the park sites.

Economic Survey

The expense of building a large impoundment must be justified when public funds are used. We, through the use of D'Arbonne Lake, are determining what effect this lake will have on the economy of the surrounding area. In short, we want to know how long will it take for the lake to pay for itself.

One of the most obvious changes in the economy, will be the increase in land values. At the request of the Commission, the Branch of Realty, U. S. Bureau of Sport Fisheries and Wildlife, conducted on appraisal of land values. Their conclusions are printed hereafter in part:

1. 1957 land values in the flood area averaged $20.00 per acre and ranged from $20.00 to $40.00 per acre in the surrounding lands.
2. Land values in 1961, within a limited area around the lake rose to $550.00 to $1500.00 per acre along the highways and $150.00 to $450.00 per acre in less accessible areas.
3. Continued and sustained rise in land values will depend on (a) use and demand from cities within a radius of 50 miles of the lake, (b) orderly and proper recreational development, and (c) success as a fishing and boating lake.

A recent check by project personnel revealed that land values on the lake were seriously inflated. Land was selling for $1,000.00 to $3,000.00 per acre with water frontage. In some cases access was based on proposed future roads. Better developed areas on the lake were bringing even higher prices.

Other factors affecting the economy of this area are also being studied. Most notable of these are boat sales, bait, groceries and fuel.

Creel Census

As part of the preimpoundment investigation, we attempted to determine the fish harvest of Bayou D'Arbonne and Corney Creek which make up most of the lake area. A creel census was designed to check the fishing pressure and act as a basis for an estimate of the total harvest.

During the past three years the number of fishermen using the bayou has shown a slight increase each year. An estimated 6,200 fishermen used the bayou during 1960-61. The following year 7,100 fishermen used the bayou and 9,000 fishermen used the bayou during the 1962-63 fishing year.

After the lake fills, the creel census will continue. The actual design of this census has not been completed.

Fish Populations and Stocking

Before adequate stocking recommendations could be made for this lake, we checked the fish population which was already present in the two tributaries. These samples were taken using hoop nets and rotenone. On the basis of these studies, we determined that the stream fish population was high in commercial fish and comparatively low in sport fish. For this reason we recommended that the spillway gates not be closed until after the spawning time of the commercial fish and shad.

In an effort to further balance the population, the project leaders recommended a heavy stocking of adult largemouth bass and black crappie. In addition we recommended a normal stocking of fingerling bluegill and channel catfish. On this basis, final stocking recommendations were 30,000 adult largemouth bass, 120,000 intermediate black crappie, 150,000 fingerling channel catfish and 15,000,000 bluegill. Late in November 1963, the spillway gates were closed and initial stocking began. At present almost 9,000,000 of the bluegill have been stocked, and approximately 5,000 largemouth bass have entered the lake.

Fish Movement Studies

Planning fish releases in any new lake is based on the probable movement of the stocked fish. The probable movements of the native stream fish population must also be considered. This study was designed to serve as a guide for future planning of stocking other lakes.

Before the spillway gates were closed, over 3,000 fish of 26 species were tagged. These will serve as a basis for determining the extent and direction of movement of these native fish.

As the lake is being stocked with hatchery reared fish, 10,000 intermediate and adult fish will be tagged prior to their release. These will be scattered over the lake. This will help us to determine at least the movement distance of the larger stocked fish. It will also serve as a guide to the movement of the fingerling fish of the same species.

In order for this study to be successful, fish carrying the tags must be recaptured. This will be accomplished in part through the use of nets, rotenone and electro-fishing techniques. The most important method for getting tag returns will be through the cooperation of individual fishermen. Anyone catching a fish with a tag attached is asked to notify the Louisiana Wild Life and Fisheries Commission at Monroe, Louisiana. The information needed with the tag return is the kind of fish, where caught, and the date caught. Such help from individuals will go a long way towards making this and other research studies a success. In addition, it will help to guarantee good fishing for all of us and our children.

Limnological Investigations

As a part of the preimpoundment investigations, both benthos and water quality in Bayou D'Arbonne and Corney Creek received attention. The benthic studies were used to determine the probable productivity of the lake. The water quality studies were used both as an indication of nutrients being washed in from the watershed and to determine the extent of salt water pollution in the area.

The benthic community in the tributary streams has shown a definite improvement during this biennium. This is evidenced by the increased variety of insect larvae present in the streams. It is further indicated by the reduction in the number of sludge worms present per square foot of sample area. For the first time since sampling was initiated in 1957, substantial concentrations of snails and clams were found.

The concentrations of both nitrates and phosphates in the stream indicate that the nutrients most needed for high productivity will be present in suitable amounts in the lake. The chlorides present in the lake which are the primary indicators of salt water pollution, have declined steadily. More emphasis on the control of salt water pollution will be necessary. At this time it is apparent that this lake will not be greatly harmed by the amounts presently entering the watershed.

LaFOURCHE LAKE

LaFourche Lake is a cutoff portion of Bayou LaFourche in Caldwell Parish. At its present pool stage of 51 feet MSL, it covers approximately 1000 acres. Early in 1961, a survey of the aquatic weeds in this lake indicated that a drawdown was the only economical method for restoring this lake to a good fishing spot. After a drawdown structure was built, the lake was drawn down 4 feet in the winter of 1961.

This first winter drawdown met with only limited success. The timing was poor and early rains refilled the lake. A summer drawdown was recommended to begin on July 5, 1962.

The drawdown structure was opened on July 5, 1962, and the water was drawn down to 45 feet MSL. This stage was reached in early September. Further work on the drawdown channel was initiated to pull the lake down to the desired level of 40 feet. As soon as this work was completed, the water was drawn down to 42 feet by December.

Due to below normal rainfall, the lake did not refill during the winter of 1962. Primarily for this season, the desired weed control was not achieved. Accordingly the water was drawn down again in the late summer of 1963. It is too early to evaluate the effect of this drawdown.

Creel Census

A creel census was initiated on LaFourche Lake in an effort to determine the harvest as affected by water level fluctuation. Due to fund limitations, the creel check was not started until after the winter drawdown of 1961-62. For this reason, a lack of comparative background data makes an evaluation impossible.

The data on the harvest of fish from LaFourche Lake as presented in Table 3, indicates that this lake is about average in catch per acre for North Louisiana. The amount of commercial development around the lake indicates that if fishing can be improved the lake will be a decided asset.

Fish Population

Rotenone tests and netting studies have been made annually on LaFourche Lake. From these tests, it is apparent that the fish population is adequate. The game fish occupied a high percentage of the total fish present. It is not deemed necessary that any fish population manipulation other than the water level fluctuation will be necessary.

During the drawdown in the summer of 1962, a study was conducted to determine the effects of heavy commercial netting on the fish populations. This study revealed that when trammel nets of from 2.5 to 4.0 inch square mesh were used that the commercial fish population, primarily buffalo and gar, could be heavily cropped. At the same time, no detrimental effect on the game fish population was noted. This may indicate that heavy commercial fishing in addition to a drawdown is practical.

Table 3

RESULTS OF CREEL CENSUS
March 1962-August 1963

	March 1962- March 1963	*March 1963- August 1963*
Fishermen checked	1,378	503
Man hours checked	2,775.00	1,028.00
Fish caught	3,153	1,368
Pounds caught	1,771.6	676.3
Fish/hour	1.14	1.33
Pounds/hour	0.64	0.66
Average weight	0.56	0.49
Estimated fishermen	9,154	5,138
Estimated man hours	36,799.00	20,963.00
Estimated fish	41,925	27,951
Estimated pounds	23,617.3	13,769.8

DINGELL-JOHNSON PROJECT F-8-R

"An Investigation of the Sport Fisheries in Coastal Waters of Louisiana."

CHARLES E. HOENKE
Fishery Biologist

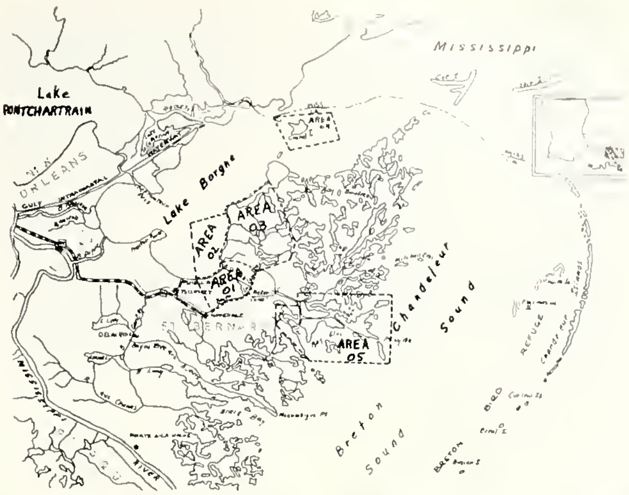
This is a progress report and a continuation of the investigation to determine the seasonal abundance, movements, feeding habits, reproduction and environmental requirements of salt water game fish in the Coastal Marsh area of Southeastern Louisiana.

Fishing methods, sample areas, and sampling schedules were continued as before. Analyses of water chemistries remained the same. Since these already established sampling methods proved to be satisfactory, no new methods were tried.

The weather station was out of order due to its destruction by rough weather through a large portion of the time between July 1, 1962 and June 30, 1963.

The five major areas for fish collecting and water chemistries were the same as used in the first two years. The sampling schedules were followed as closely as possible.

The main fishing gear used to collect and sample large fish was the 200 yd. trammel net. A 6 ft. cast net was used to collect juvenile fish and bait fish at two stations in the marsh.



Trammel net used in taking fish population samples from coastal waters.

A fish population sample taken with a trammel net to investigate the sport fishes of the state's coastal waters.

DINGELL-JOHNSON PROJECT F-9-R

An Ecological Survey of Factors Affecting Fish Production in a River and Backwater Area

KENNETH E. LANTZ
Fishery Biologist

Project F-9-R was inaugurated July 1, 1960 and will terminate June 30, 1964. The project consists of six different jobs and when completed should give needed information as to the normal ecological conditions of the Spring Bayou backwater area and Amite River.

The Spring Bayou backwater area is located in the flood plains of Avoyelles Parish comprising a size of approximately 1,500 acres. The area is made up of several lakes of various shapes and sizes. The majority of the lakes are permanent bodies of water; however, they vary considerably in depth depending upon the amount of backwater from the Red River. Until the spring of 1955, when the Department of Public Works constructed a dam in Little River, the majority of the lakes were not permanent water bodies. The purpose of the dam was to stabilize the water level in the many lakes and provide an access area to excellent fishing the year round. Instead of the supposed access, the stabilized water level favorably influenced the growth of coontail, *Ceratophyllum* sp. and *Potamogetom* sp. to such an extent that the area is practically non-navigable during the summer months. The majority of the lakes vary in depth from 8 or 9 feet in the late winter and spring to approximately 2 to 4 feet in late summer.

Numerous dead trees and stumps are found throughout the backwater area with some stands of bald cypress, *Taxodium distichum* and bottom bush, *Cephalanthus occidentalis* occurring in the lakes. The numerous islands occurring in the area support a dense growth of many woody plants. The submerged aquatic plants appearing in the area during the summer months appear to be directly proportionate to the amount of backwater coming into the area the prior winter and spring.

The Amite River originates in the southern part of Mississippi and empties into Lake Maurepas with approximately 90 miles flowing through the southeastern section of Louisiana. The river varies in size and depth depending upon the location and season of the year. The first sampling station located near Grangeville is approximately 100 feet wide in the late summer to 8 or 9 feet in late winter and early spring. Occasionally each year during times of excessive rains the high water overflows the banks of the river causing some flooding in the surrounding area. At the present time the United States Army Engineers has a channe alignment project on the river to prevent flood ing of the adjacent areas of the Amite River.

In the past the Amite River has offered som of the best stream fishing in the state. It i noted for its fine yellow bass run in the sprin months as well as other species, year round.

STUDY OF CHEMICAL AND PHYSICAL FACTORS

Each month at predetermined stations, chemical analyses are conducted for the amount o dissolved oxygen, free carbon dioxide, alkalinity and pH. These analyses are checked in the field. Water samples are also collected and preserved by freezing, and are returned to the laboratory at New Orleans for analyses of total and available phosphates, ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen. Physical analysis of water samples for turbidity and color, along with temperature recordings of both air and water, are conducted each month in the two study areas.

Tables I and II indicate the average chemical conditions of water at the two study areas for July 1, 1962 through June 30, 1963.

Table I

FIELD WATER CHEMISTRY YEARLY AVERAGES
(Recorded in degrees Farenheit and parts per million)

Spring Bayou Area
July 1, 1962—June 30, 1963

	Station		
	I	*II*	*III*
Temperature			
Air	77.6	77.9	78.9
Surface	72.7	72.7	73.0
Oxygen	7.5	10.1	11.5
CO_2	5.9	2.6	3.0
Alkalinity			
ph-th	0.0	1.3	0.0
MO	49.5	46.2	45.3
pH	7.0	7.5	7.6
Secchi Disc in ft.	0.9	0.6	0.7

Table II

FIELD WATER CHEMISTRY YEARLY AVERAGES
(Recorded in degrees Farenheit and parts per Million)

Amite River
July 1, 1962—June 30, 1963

	Station				
	I	*II*	*III*	*IV*	*V*
Temperature					
Air	81.9	81.7	82.3	82.9	83.3
Surface	72.1	73.3	73.3	72.5	73.3
Oxygen	11.1	12.3	11.6	10.7	9.3
CO_2	3.0	2.6	3.0	3.2	6.6
Alkalinity					
ph-th	0.0	0.0	0.0	0.0	0.0
MO	19.8	22.8	22.2	21.5	27.1
pH	6.9	6.9	6.9	6.8	6.7
Secchi Disc in ft.	1.9	1.7	1.8	1.7	2.8

PLANKTON STUDIES

This study deals with the small plant and animal organisms found free floating in the water. These free floating organisms are the first in a series of food items of a lake's food chain that are taken by fish. Plankton is of great importance in the diet of a young fish. The success or failure of a fishery is influenced directly by the abundance and distribution of plankton. The fate of many fish immediately after hatching depends upon a plentiful supply of these microscopic plants and animals.

Plankton samples are taken at a depth of three feet with the use of a portable power pump. At each sampling site a one liter-net-filtered nannoplankton sample and two twenty liter net-plankton samples are collected. One of the two net-plankton samples is preserved in alcohol for subsequent laboratory gravimetric analysis, and the other net-plankton sample is preserved in formalin for qualitative analysis. The nannoplankton are the smaller plants and animals that are able to pass through a plankton net made of no. 20 standard silk bolting cloth with 173 meshes to the inch.

Table III and IV show the yearly average number of plankters per liter of water collected at each study area from July, 1962 through June, 1963.

Table III

NET PLANKTON YEARLY AVERAGE
(Recorded in average number per liter)

Spring Bayou Area
July, 1962—June, 1963

	Station		
Organism	*I*	*II*	*IV*
Nauplius	43.6	51.1	31.7
Cladocera	3.7	9.8	1.9
Ostracoda	0.2	0.3	0.1
Copepods	0.3	0.1	0.2
Eucopepoda	2.6	7.7	7.1
Rotiefera	530.0	466.7	488.9
Chlorophyta	870.0	733.3	777.8
Chrysophyta	50.0	233.3	100.0
Cyanophyta	120.0	44.4	200.0
Euglenophyta	290.0	300.0	244.4
Cysts	10.0	33.3	66.7

Table IV

NET PLANKTON YEARLY AVERAGE
(Recorded in average number per liter)

Amite River
July, 1962—June, 1963

	Station				
Organism	*I*	*II*	*III*	*IV*	*V*
Nauplius	0.9	1.3	2.8	1.4	7.1
Cladocera	0.4	0.3	1.5	2.0	0.4
Copepoda	0.4	0.2	0.5	0.3	0.3
Rotifera	44.4	33.3	290.0	260.0	210.0
Chlorophyta	155.6	166.7	290.0	200.0	150.0
Chrysophyta	266.7	222.2	30.0	30.0	20.0
Euglenophyta	22.2	....	20.0	30.0	50.0
Pyrrophyta	....	11.1	....	....	....
Cysts	....	33.3	50.0	40.0	....

Determination of dissolved oxygen in a sample of water taken from Amite River made by Fishery Biologist Kenneth Lantz.

BOTTOM FAUNA STUDIES

Bottom fauna includes all organisms living on or in the bottom of a body of water. Benthos constitute a large portion of the diet of many of the game fish as well as other fish. Benthos sampling is done quarterly in the same location with the use of Peterson dredge and washed in a No. 30 sieve.

The number and size of these organisms may vary greatly from one section of a lake to another depending upon the depth, soil type, chemical and physical condition of the lake, seasons of the year and several other factors.

ABUNDANCE OF YOUNG FISH OF THE YEAR

The objectives of this job are to determine the annual spawning success of the fish population in the selected areas and to compare the spawning success of the game species with that of the rough or trash species.

The reproduction samples from the Amite River were taken with a 39 foot nylon bobbinet seine. Six 600 square foot samples were collected

Operation of water pump in removing ten gallons of water from Spring Bayou for determination of plankton production.

and an average of the six samples are presented in the table below. Sampling in the backwater area was done by applying rotenone to an area of approximately 600 square feet. This method was used because the dense growth of aquatic plants prohibited the use of a seine.

FISH FOOD STUDIES

Fish food studies are accomplished by removal of the fish stomachs usually at the time the population samples are conducted. The contents present in the stomachs are examined and identified as to the kind and number of organisms.

With such information, fisheries personnel are able to determine the preferred food of fish. A correlation between the bottom fauna present in the lake and the organisms being utilized by the fish may also be made.

FISH POPULATION STUDIES

Fish population samples were taken from the two study areas with the use of rotenone. Three one-acre samples were taken from both areas. A seine of one-inch mesh webbing was used to enclose the acre and the rotenone was distributed evenly throughout the area. As the fish surfaced, they were picked up, weighed, measured, and counted.

The Spring Bayou backwater area in August, 1963 produced an average of approximately 316 pounds per acre of fish. Of this total poundage, 124 pounds or 40% were game fish species.

The Amite River yielded in September, 1963 an average of only 19 pounds of fish per acre. Of this poundage, 2 pounds or 10% were game fish.

This project will terminate June 30, 1964 at which time the results of this study will be tabulated and published. The data received from this detailed ecological survey should aid in establishing normal conditions of these two areas and serve as a guide in detecting abnormal conditions in the two areas as well as similar areas in Louisiana.

DINGELL-JOHNSON PROJECT F-10-R

Age and Growth Studies

VICTOR W. LAMBOU
Fishery Biologist

JOANN WILLIAMS
Biological Aide

The purpose of this study was to determine the time of annulus formation, if annulus-like marks are formed only once each year, and the factors responsible for the formation of annulus-like marks so as to evaluate the validity of the scale method for aging important game fish in Louisiana.

The scales used in this study were taken mainly from fish collected during routine fish population sampling operations conducted on various bodies of water throughout Louisiana. Fish were collected by seines, gill nets, wire traps, trammel nets, minnow seines, and rotenone.

Scale samples were collected and placed in small envelopes on which were recorded the species, location collected, date, gear collected with, length, weight, sex, and sexual condition of the fish. Each scale sample was given a serial number and the data relative to the fish were entered on a punch card. Usually three scales from a sample were mounted between two microscope glass slides. Only the serial number of the scale sample was recorded on the tape binding the slides together after the scales were thoroughly wet, a slide was placed in a scale projection machine and projected at a magnification of 44 times.

The usual criteria were used for the recognition of annulus-like marks on the scales including the feature of "crossing over". A "recently formed annulus-like mark" was defined as a mark on the outer edge of the scale having one or two complete circuli laid down over the complete circuli so that there is definite "crossing over". For a mark to be considered as recently formed it was necessary for it to appear on all of the scales on the slide and to appear on both the left and right lateral fields, including the feature of definite "crossing over". The slides were examined on two separate occasions, and any discrepancies were resolved by further independent examination of the scales. When examining a scale sample, the operator was only aware of the serial number of the scale sample and the species of fish.

Following are abstracts of three reports which gives the results from three species of game fish:

It was concluded that for routine studies it is impossible to age bluegill in Louisiana by the scale method with any reasonable degree of accuracy. There appears to be no definite pattern of any kind in laying down of annulus-like marks on the scales of bluegill in Louisiana. It is probable that many of the fish are laying down more than one annulus-like mark during a year in a variable manner. Among the factors which appear to be directly or indirectly affecting the formation of annulus-like marks are temperature, area of the state, type of water, year, size of fish, and sexual development of the fish. The long growing season in Louisiana is probably a contributing cause. There is some indication that the first "true" annulus is not laid down or is very difficult to distinguish on some fish.

Oysters, Water Bottoms and Seafoods Division

LYLE S. ST. AMANT
Chief

THE ACCOMPLISHMENTS of the Division of Oysters, Water Bottoms and Seafoods have increased considerably during the past biennium, particularly in the area of biological research.

During this period shrimp research has expanded and intensified and the results therefrom have allowed for reasonably accurate predictions of the annual shrimp crop. This information has been utilized extensively by the shrimp industry in 1962 and 1963 and it is believed that the future will find much more use of such technical data.

Biological research on oysters continues at the high level established during recent years. Much of the oyster information has now reached a point where it is being applied on a development and management basis, such as, the planting of shells for cultch, the rotation of oyster seed grounds for higher production and the application of hydrographic data to the prediction of oyster conditions.

In addition to the extensive work on oysters and shrimp, considerable effort has been applied in aiding the crawfish industry in pond culture.

Supervising and surveying all oyster leases, the issuance of permits for dredging and the direction of seismic and waste control surveillance has been maintained at an efficient level of operation. Some phases of this type of administrative procedure is now undergoing examination in order to see if more efficient and modern approaches can be applied.

The following report will outline some of the major activities of the division including discussions of shrimp and oyster production, a statistical evaluation of revenues and, in particular, a rather detailed section on the research accomplishments realized during the past biennium.

SHRIMP PRODUCTION

Shrimp production reached a low point in 1961 equivalent to the all time low established in 1957 when only thirty million pounds of shrimp (heads on) were produced in the State. Production in 1962 showed a marked increase reaching forty-six to fifty million pounds (heads on) and in 1963 production nearly doubled, reaching a figure of approximately eighty-three million pounds (heads on) which represents a production equal to some of the best years in the history of the shrimp industry.

To date no research carried on by this State or Federal Agencies has been able to pinpoint the reasons for the low shrimp production in 1957 and 1961. Research, however, has been able to determine well in advance the trend of

TED B. FORD
Assistant Chief

production and has been able to advise the industry what to expect in each season. This type of prediction is based on extensive studies of the movements and population density of the very young shrimp, and the correlation of these data with hydrographic information. It is believed that when enough information is on hand we may be able to determine the causes of sharp declines in shrimp production.

One thing is quite evident and that is that more and more technical information and research must be done on a continuing basis if the shrimp industry is to attain the maximum benefit from this natural resource.

OYSTER PRODUCTION

Oyster production in 1962 and 1963 as shown in the accompanying production tables tends to indicate that there has been a reduction in production in 1963. It is doubtful that these figures accurately reflect the actual production from Louisiana for these reasons:

1. The figures reported here represent calendar year production rather than seasonal production and are therefore a combination of the production from two distinct growing seasons.
2. Accurate statistics kept on small areas such as Calcasieu Lake and our seed oyster reservation tend to indicate that production is much higher than indicated by the figures reported.

In general oyster production in 1962 and 1963 has been the highest in recent years. This was brought about by greater market demands and exceptionally heavy seed production in late 1962 and early 1963. It is felt that some changes should be made in the statistical approach used for determining oyster production. Certainly better accuracy and more complete production figures must be obtained and, in any event, production in future years must be tabulated on a seasonal basis rather than on a calendar basis. Such an approach should give a much clearer picture of the annual seasonal production in the State.

SHELL PLANTINGS AS OYSTER CULTCH

The planting of clam shells and reef oyster shells as cultch to serve as a substrate for oyster spat to set on has been developed to a high degree through the research efforts and field application carried out by the Marine Biological Section.

A full description of the methods used and the results obtained has been detailed in the seventh, eighth and ninth biennial reports. For the most part the development of seed areas by shell plantings has been placed on an annual basis excepting those years when it is established that sufficient natural seed were available to supply the industry. Successes in 1960 and 1961 made it possible to reduce the shell planting in 1962 and to eliminate one in 1963, when it was established that exceptionally heavy oyster sets had occurred naturally.

In 1962, 140,679 barrels of clam shells were planted as cultch in the Black Bay area near Snake Island. The results from these plantings followed a pattern of success similar to previous years. Planting procedures are now refined to the point that the shells can be planted very rapidly during the period of peak oyster set. This has resulted in securing initial spat setting in excess of 75 to 80 percent with an expected 100% set on all exposed shells before harvesting 16 months later. In 1963 there were no shells planted for cultch since an extremely heavy seed crop was evident and it was deemed unnecessary to supplement this production. Funds allocated to shell planting were therefore available to move 12,750 barrels of live oysters from the route of dredging operations in Calcasieu Lake and to place them in an area of maximum production. This operation was carried on in April and May of 1963 and has proved to be highly successful.

SEED OYSTER RESERVATIONS

Extensive studies of oyster production in the Sister Lake seed oyster reservation has established the fact that under natural conditions the best sustained yield for an area can be accomplished by harvesting on alternate years. It was shown that in years of optimum hydrographic and setting conditions natural reefs could produce sufficiently to be harvested annually but that in most years conditions were not suitable to attain maximum production. Therefore a sustained high yield was obtained only by harvesting on alternate years. Because of the exceptional results obtained in managing Sister Lake seed reservation it has now been established by the Louisiana Wild Life and Fisheries Commission that all seed oyster reservations will be harvested on the alternate year plan. In order to allow for maximum benefits to the oyster growers, Sister Lake and Bay Gardene are now harvested on alternate years, i.e. Sister Lake was harvested in 1962-63 and Bay Gardene is being harvested in the 1963-64 season. This procedure will be continued indefinitely.

The successful results of this plan of management is already evident in the production from Sister Lake in the 1962-63 season which amounted to 50,000 barrels.

CALCASIEU LAKE

Calcasieu Lake is of considerable interest as an oyster area because it has recently been opened to harvesting and because it is a discreet area where the production can be accurately tabulated. In the 1961-62 season production from this small area exceeded 120 thousand sacks while in 1962-63 production increased to 132 thousand sacks. This production figure illustrates the vast potentials of the oyster growing area of Louisiana. It is probable that not more than three to five hundred acres are being harvested in Calcasieu Lake and all harvesting is confined to the use of tongs, yet this small area has increased the gross economy of the local area by approximately one-half million dollars annually.

MENHADEN

Menhaden production in Louisiana is increasing rapidly. Recent production figures indicate more than one billion pounds of menhaden are taken annually from our coastal waters. It is evident that this industry is rapidly becoming one of out greatest fisheries and it is believed that technical services and research should be furnished the industry compatible with its value to the State.

SHRIMP PRODUCTION (Heads On)

Year	*Bbls.**
1961	148,423
1962	208,920
1963	390,404

FRESH WATER FISH PRODUCTION (Lbs.)

1961	16,984,700
1962	18,611,616

SALT WATER FISH PRODUCTION (Lbs.)

1961	16,524,300
1962	15,087,883

BABY GREEN TURTLES (No.)

1961	1,385,000 (50 per lb.)
1962	738,950

MENHADEN PRODUCTION (Units)

(one unit—666 lbs.—approx. 1,000 fish)

1962	1,033,770
1963	951,177

REPORT OF COLLECTIONS (Fiscal Year)

	1961-62	*1962-63*
Oyster bedding ground rentals	$ 71,033.53	$ 78,342.00
Oyster privilege tax	16,778.34	13,220.30
Oyster tonnage licenses	1,981.50	2,499.00
Oyster dredging licenses	12,400.00	15,400.00
Oyster resale, shop, etc.	1,830.00	1,930.00
Transfer fees	23.00	49.00
Shells (oyster)	472,180.17	493,894.39
Shells (clam)	343,014.56	324,247.39
Gravel	....	2,149.85
Sand	3,194.46	2,905.91
Fill material	71,135.17	72,833.96
Survey fees	23,229.60	17,418.50

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*210 lbs. per bbl.

REPORT OF PRODUCTION (Calendar Year)

Total barrels of oysters taken from Louisiana waters

	1962	*1963*
Terrebonne	93,434.50	113,802.75
Lafourche	74,639.50	57,366.00
Plaquemines	186,879.50	78,046.50
Jefferson	130,757.75	73,783.00
St. Bernard	106,750.00	106,719.00
Cameron	14,751.50	18,862.00

Total cubic yards of sand, shells, gravel and fill material taken from Louisiana waters

	1962	*1963*
Sand	63,352.93	76,472.75
Oyster shells	4,089,290.97	4,243,379.38
Clam shells	2,827,501.34	2,953,222.50
Gravel	25,500.00	46,348.43
Fill material	3,438,831.02	2,372,298.00

Marine Biological Section

JAMES G. BROOM
Ass't Chief Marine Biologist

RANDALL K. PIERCE
Marine Biologist

CHARLES J. WHITE
Marine Biologist

BENTON G. ADKINS*
Marine Biologist

WILSON J. GAIDRY
Marine Biologist

BARNEY B. BARRETT
Hydrographer and geologist

*On Military Leave.

INTRODUCTION

The Marine Biological Section has provided an increased supply of technical information and research data to the fishing industry of the State of Louisiana during the past Biennium. This accomplishment occurred in spite of the losses of numerous key personnel. For the most part the great impetus in research has been brought about by the extensive and intensive shrimp research program that is gradually becoming an annual procedure. The manifold problems, in the marine environment however, necessitates that expansion and continuity of research efforts be maintained on a permanent basis to an extent that the needs of the fishing industry of Louisiana are adequately met.

The importance of marine seafood production and its attendant problems in the northern Gulf ranks first in the United States. To a large extent the key to our knowledge of northern Gulf production lies in the effects of the Mississippi River on the area. Since this valuable and all important estuarine area is the source of Louisiana's great seafood production, it should be the aim of our state to be the leader in the field of marine research and applied biology for the area. To obtain this, expansion of facilities and manpower must continue which in time will necessitate budget increases. The net result will eventually furnish protection, improvement, and an understanding of ways and means to maintain our great seafood potential.

Basically the present program of the marine biological section deals principally with the many phases of research needed to maintain our great shrimp and oyster fishery. In addition, work on marine fisheries, crabs, and sport-fishing is contemplated. In general, the type of work being done may be categorized as follows:

1. Long range investigations: Aimed at bettering seafood production and quality and at alleviating various ills of the industry.
2. Short range studies and field examinations: Designed to furnish some immediate information which may be used by the Wild Life and Fisheries Commission in formulating rules, regulations, and policy concerning marine problems.
3. An extensive research program on shrimp is being developed which deals with breeding, growth, movements, and the effects of salinity and temperature.
4. An oyster research program aimed at bettering the state's production and quality of this valuable resource. Much work is planned toward controlling predators and diseases.
5. Direct technical aid to oyster growers: This is an extensive type service offered the individual oyster grower. Upon official request, problems on individual oyster leases are studied and reported on.
6. Development and management: Natural state seed grounds and oyster reservations are studied and managed annually to achieve maximum production. Supplemental seed oyster production is accomplished by shell plantings.
7. Cooperative research: Cooperative research is carried on with the food technology laboratory at Louisiana State University and other university and governmental research agencies interested in marine problems.
8. Education: The biological staff and the facilities of the marine laboratory are available and are frequently engaged in various cooperative educational programs with the universities, colleges, and high schools of Louisiana. Short courses, field trips and lectures are provided for interested parties upon official request.
9. Water resources and pollution: Continual availability of maximum acreages of unpolluted estuarine areas are a necessity if Louisiana's seafood industry is to survive and increase. The technical staff makes studies, prepares reports and acts in matters of interagency coordination where estuarine problems are concerned. Much work has been done on the Mississippi River-Gulf Outlet, various other navigation channels and on projects to introduce river water into our excessively saline marsh areas. Studies of industrial pollution and specific pollution problems in oyster areas require approximtaely 30 percent of work schedule of the present staff.
10. Other activities: Some time is spent in preparing papers and publications to be given at various meetings. The senior biologist is also active on various inter-state and national committees, some of which are (a) Shellfish research committee, Gulf States Marine Fisheries Compact, (b) Estuarine Committee, Gulf States Marine Fisheries Compact, (c) Shrimp research committee, Gulf States Marine Fisheries Compact, (d) Pollution committee, Southeastern Section, American Fisheries Society.

The following report will detail typical examples of the work outlined above and will describe the location and extent of the new laboratory facilities.

RESEARCH HEADQUARTERS AND LABORATORY FACILITIES

The Wild Life and Fisheries Commission's modern and extensive laboratory facilities were basically completed in August 1960 when the main laboratory building was occupied.

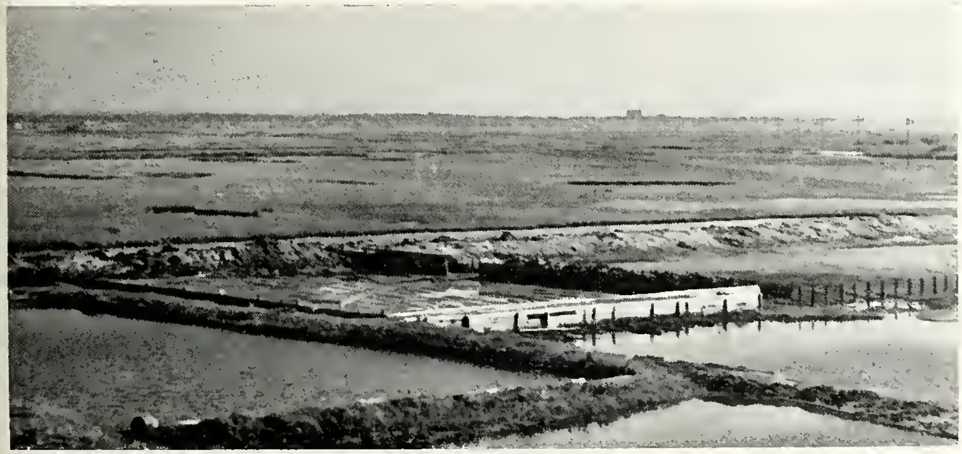
Since that time increased research activities and a larger staff has necessitated an expansion of the research facilities and housing as the unit becomes a permanent marine station. Some of these physical accomplishments now completed or in the process of construction are as follows:

1. Construction of dormitory and duplex housing for the staff which releases about 25% of the main laboratory space to research area.

Aerial view of Grand Terre Marine Laboratory with construction of additional facilities in progress.

2. Completion of a boathouse for small boats.
3. Completion of a new 46,000 gallon fresh water storage tank.
4. Addition of outside electrical service lines.
5. Installation of a new 6 inch salt water pump to furnish water to shrimp ponds and laboratory.
6. Establishment of 6 one-quarter acre ponds for shrimp pond culture experiments.
7. Construction of 4 1/200th acre holding tanks for shrimp research.
8. Dredging of two deepwater (10 feet and 14 feet deep) wintering ponds for shrimp research.
9. Construction of bulkheading around part of the turning basin.
10. Establishment of small boatways and loading ramp.
11. Creation of a grass air strip for small planes.
12. Construction of shell roads and paths.
13. Purchase of a 43 foot offshore research vessel, the "Marine Research".

It is felt that Louisiana can be justly proud of its new marine research facility. The interest shown and the use made of the marine laboratory by groups outside the Wild Life and Fisheries Commission has been most gratifying and serves only to further amplify the long and great need for such a facility on the Louisiana coast. During the short existence of the new laboratory it has functioned as a training and research area for university scientists, high school teach-



Completed and partially completed one-fourth acre ponds for shrimp cultivation with two deep overwintering ponds in the foreground.

Two-hundredth acre concrete holding tanks for shrimp.

ers, college and high school students, and a meeting place for various governmental committees and research scientists concerned with marine work.

It is evident that the Wild Life and Fisheries Commission's Marine facilities are rapidly expanding and in time will become a permanent station equal to any such establishment on the northern gulf. Equipping the station with physical apparatus and housing requires only an adequate budget and time; on the other hand, staffing this facility with permanent well trained personnel is a major problem. At the present time the availability of trained marine scientists is extremely limited. Salaries until recently have not been competitive with other states and agencies. Even with reasonable salaries at present, staffing remains a problem because of the isolated nature of the station and a lack of graduates in marine biology in the Louisiana area. Every effort is being made to obtain a full complement of research personnel who will be satisfied to work permanently in the area.

I. HYDROGRAPHY

A working knowledge, both past and present, of hydrography and climate is necessary for an intensive study of marine life. The researcher, when trying to improve the species, predict and control production, or simply to gain information, must be familiar with the ecology of the animal under investigation.

Each year the hydrographic phenomena of the Baratraia Bay region and its relationship to marine life are better understood due to the increased amount and kinds of information gathered, and because of the increased time span over which these data have been kept and compared.

Here at the Marine Laboratory many man-hours and a great deal of equipment are utilize in recording, comparing, and analyzing hydrographic and climatic data. Continuous recordings, dating back 6 and 7 years, are made fo salinity, wind speed and direction, air and wate temperature, barometric pressure, rainfall, and tides. Data from agencies of the federal government and private industry on river stages, Louisiana rainfall, salinities, temperature, and seafood landings are correlated with our loca information. Daily, monthly, seasonal, annual, and long term highs, lows, and averages are calculated for each of these hydrographic and climatic phenomena, and each time period is compared with those of previous years. One of the objectives which may result by comparing correlating, and analyzing these data is the determination of optimum conditions for such valuable seafoods as oysters and shrimp.

Regular weekly hydrographic runs, covering more than 200 miles of water area, are made in the bays of Barataria and Caminada and the near offshore area. These runs are made to compare water changes at our permanent stations with the surrounding areas, to determine salinity and temperature trends, to locate source areas, to determine paths and directions of fresh and salt water intrusions into the bays, and to obtain the hydrographic conditions at the time and place of biological sampling.

Special hydrographic studies are made by laboratory personnel in other areas of the Louisiana Coast in addition to the concerted effort made in Barataria and Caminada Bays. When possible, hydrographic studies are made before, during and after channels or pipelines are dredged in order to determine what detrimental effects, if any, the altering or impeding of local currents and increased turbidities will have on nearby marine life. The introduction of pollution, dredging operations, and even the ramming of boats and barges into oyster grounds along the Louisiana Coast result in large-scale damage

Hydrographer checking standard rain gauge. Laboratory facilities in background.

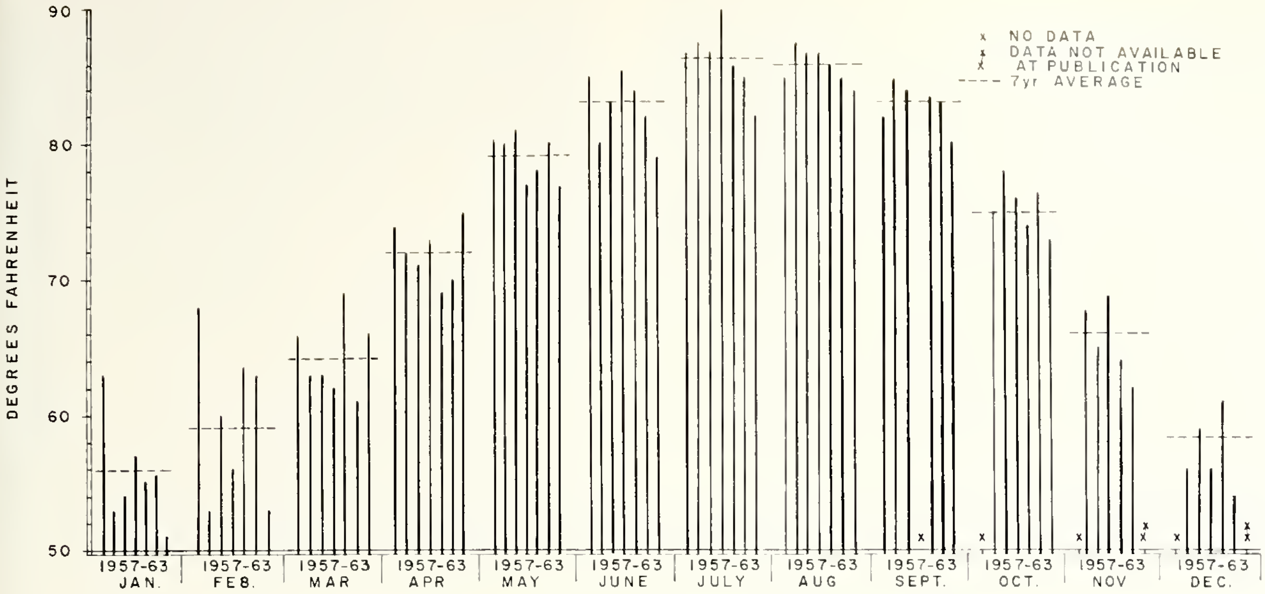


Fig. I-SURFACE WATER TEMPERATURES- GRAND TERRE MARINE LABORATORY

to the oyster industry. When an oysterman experiences undue increases in oyster mortalities, a study of the area is made to determine what water and/or water bottom changes have occurred which would be detrimental to the oysters.

It would be desirable, from the standpoint of conservation, to be able to protect the useful products of the sea from unnecessary destruction caused by uncontrolled dredging and careless water pollution. Accordingly, some of these hydrographic studies should provide the basis or background knowledge for providing improved recommendations on an up to date basis for the various types of constructional activities in the coastal marshes which would prevent or minimize damages to fisheries and wildlife habitat.

A. SURFACE WATER TEMPERATURES

One of the most critical environmental factors is water temperature. There is strong evidence that the volume of shrimp caught during a season depends primarily on the characteristics of water temperature during the late winter and early spring. Pertinent considerations include the following: the number and severity of the freezes; how late in the winter and early spring the freezes occurred; and, were warming trends followed by considerably cooler weather or did the temperatures warm early in the year and remain warm.

The water temperatures during two of Louisiana's lowest shrimp catch years, 1957 and 1961 showed marked differences from the more productive years of 1958, 1959, 1960, 1962, and 1963. A comparison of the monthly average surface water temperatures during each year is made with the 7 year (1957-1963) monthly average temperature (Figure 1).

The monthly average temperatures of the 1962-1963 late fall and winter (Nov. and Dec. of 1962 and Jan. and Feb. of 1963) were the lowest during the 7 year period. The 1962 November temperature of 62° F. was 4 degrees lower than the November average for the 7 years. December was 4 degrees lower, January was 4.5 degrees lower, and February was 6.5 degrees lower.

After the low temperature was reached in January of 1963, each succeeding month through August was warmer, after which the temperature began to fall. January and February of 1957 were the warmest of the late fall and winter months during this seven year period. The average temperature in February 1957 was equivalent to the 7 year average temperature for April. In 1957, the average temperature in March dropped more than 2 degrees lower than that of February. In 1961, the January temperature was slightly lower than the 7 year average for the same month, while that of February was the second highest for any February, that of 1957 being the highest. March of 1961 was 5 degrees higher than the average March temperatures. April of 1961, which had the lowest average for that month during the seven year period, had the same average temperature (69° F.) as March of that year. This was the only year that the April temperature did not increase over the March temperature.

Unusual temperatures were recorded thus far in 1963. The average temperature of January, February, May, June, July, August, September, and October, were lower than the same months during the preceding six years. In 1963, April was the warmest (75° F.) and March was the next warmest (66° F.) of the preceding six years. Another unusual year was 1957 in that the temperatures from January through July were higher than the 7 year average for these months.

A comparison of the daily average water temperatures of 1962 with 1963 reveals that average daily water temperatures dropped below 32° F. in January of both years. During February of 1963, the water temperatures did not warm to the seven year average daily temperature for February. The daily average temperature in 1963 did not reach 63° F. until the 11th of March, while in 1962 the daily average temperature reached 62° F. five times before the 11th of March for a total of 18 days.

In 1962, water temperatures rose above 68° F. on January 25th, and it was not until March 11th that this daily average temperature was reached in 1963. Average water temperatures in 1962 dropped below 56° F. twice in March, whereas, in 1963, the temperature remained above 56° F. after the 23rd of February. Although the low temperatures of January and February in 1963 were more severe than those in 1962, the water temperature in 1963 continued rising after it began to warm and did not fluctuate as much as those of the previous year.

B. BARATARIA BAY SURFACE WATER TEMPERATURE DIFFERENCES

Surface water temperatures are taken on the bay side of Grand Terre and ten miles to the north at Manilla Village. Manilla Village is in an area which receives a great amount of fresh water runoff from the marshes and bayous, while the lower or south bay receives waters from the open Gulf.

The salinity differences in these two areas, north and south bay, are presented in the discussion on the relationship of rainfall and riverstage with salinity. Water temperature is another phenomenon where appreciable differences are evident between the waters of the northern and southern bay. These differences in salinity and temperature are due primarily to distance from the Mississippi River, proximity to fresh water drainage and depth diversities.

The difference between fresh water drainage and Gulf waters on surface water temperature is illustrated in Figure 2. The fresh water entering Barataria Bay comes from shallow marsh areas and small bayous where the water temperature is influenced by changes in air temperature more so than the relatively deep Gulf. Therefore, the waters of the northern bay are cooler in winter and warmer in summer than those of the south bay.

This temperature reversal between the north and south bay took place in February and November of 1962. In 1963, the reverse occurred in March. The greatest temperature differences between the two areas occurred in January when the cold air temperature had a greater effect on the shallow marsh water than on the relatively deep and constantly mixing Gulf.

A comparison of 1962 with 1963 shows that the north bay became warmer than the south bay in February 1962, whereas this reversal did not take place in 1963 until March. The reason for this late change over in 1963 was due to the colder air temperature in 1963. During January, February, and March of 1963, the average air temperature was 53° F., while during this same

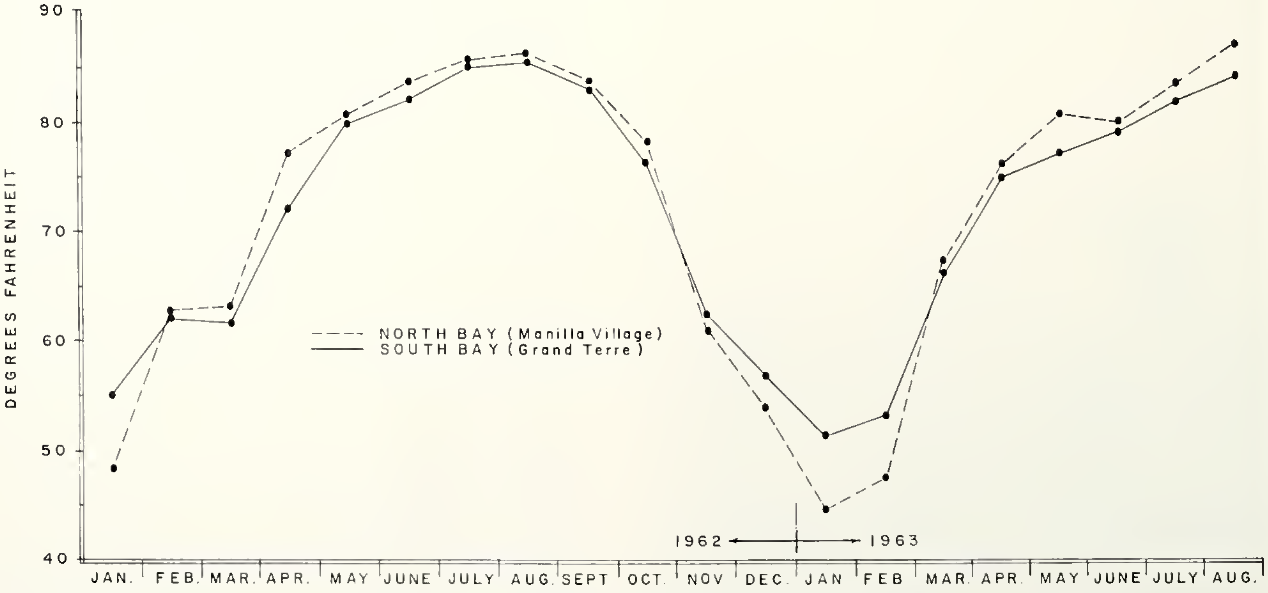


Fig. 2- COMPARISON OF BARATARIA BAY SURFACE WATER TEMPERATURES

time period in 1962, the average air temperature was 62° F.

In 1962 the north and south bay experienced the greatest increase in temperature during April, and both areas of the bay had their greatest temperature drop in November. The greatest temperature increase through August of 1963 occurred during March.

A comparison of water temperatures for the period, January through August of both years, shows that the waters in the north bay were 2.4° F. warmer in 1962 than in 1963. The waters in the south bay were 1.9° F. warmer in 1962 than in 1963.

The warmer waters during 1962 in both areas were primarily caused by the warmer air temperature in 1962. The greatest water temperature changes occurred during the winter, fall, and early spring months. From May through August of 1962, the monthly change was only 1.8° F. per month, and for this same period in 1963, the monthly temperature change was 2.6° F. average change per month for the north bay. Similarly, from May through August in the south bay, the monthly change in 1962 was 1.7° F., while the monthly change in 1963 was 2.3° F.

In 1962, the March temperature in the south bay was 0.5° F. colder than the water temperature in February, while in 1963, the water in the south bay was becoming progressively warmer during each month.

C. SURFACE WINDS

Winds in the Barataria Bay region directly affect such environmental factors as turbidity, water chemistry, temperature, tides, currents, direction and distance of travel for many of the planktonic organisms inhabiting this area. Because of the importance of winds, weather information is recorded at the Marine Laboratory and correlated with hydrographic and biological data.

Monthly winds, comparing 1962 with 1963, are shown in Figure 3. The radiating lines indicate the direction from which the wind blew, and the length of the lines are a result of the formula:

$$\frac{\text{wind speed (in mph) X wind duration (in hours)}}{2}$$

As the above formula is used in the following discussion, reference to greatest winds refers to winds of longest duration, winds of highest velocity, or a combination of both. A 5 mph wind blowing for 10 hours would have the same value as a 10 mph wind blowing for 5 hours.

During the winter months, northers blow in from the northwest to the northeast, averaging 20 to 25 mph with gusts up to 40 mph. These northers usually last from 2 to 3 days, and as a result of this cold wind, water temperatures are lowered and turbidities increased.

North winds, those from the northwest to northeast, were the predominant winds in 1962 during January, March, September, November and December, with greatest north winds occurring during March. Through September of 1963, north winds were predominant in January, February and September with greatest north winds occurring in January.

South winds, those from southeast to southwest, were the predominant winds in 1962 during February, April, May, June, July and August, with April having the greatest winds from this direction. Through September of 1963,

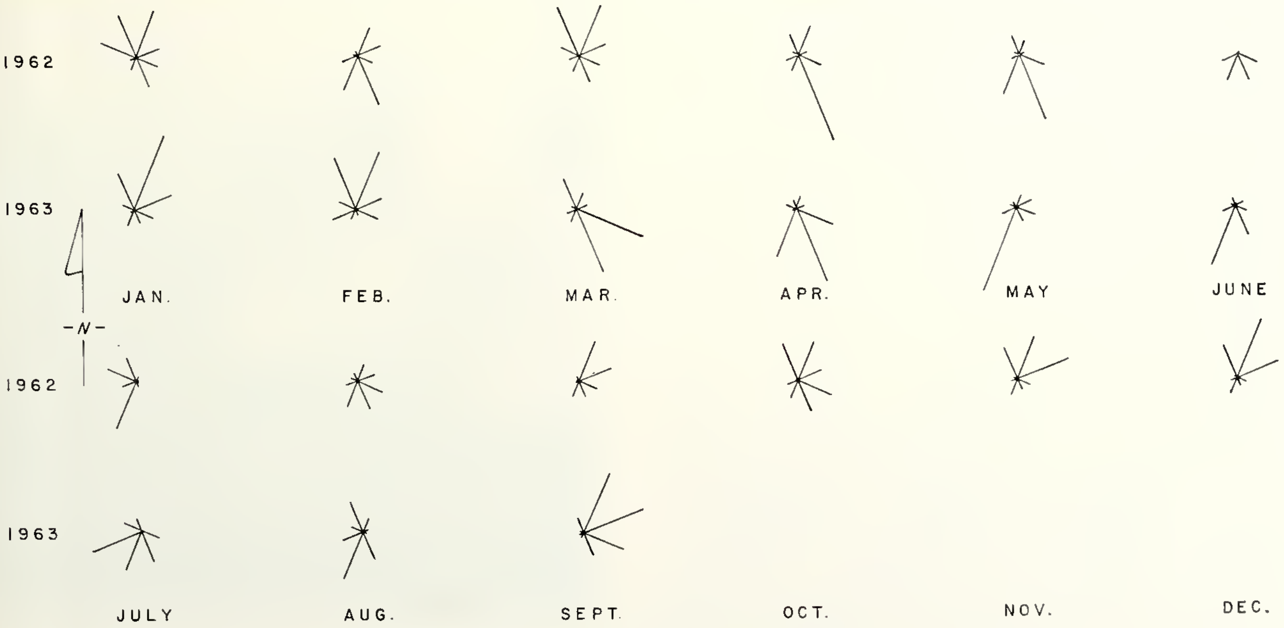
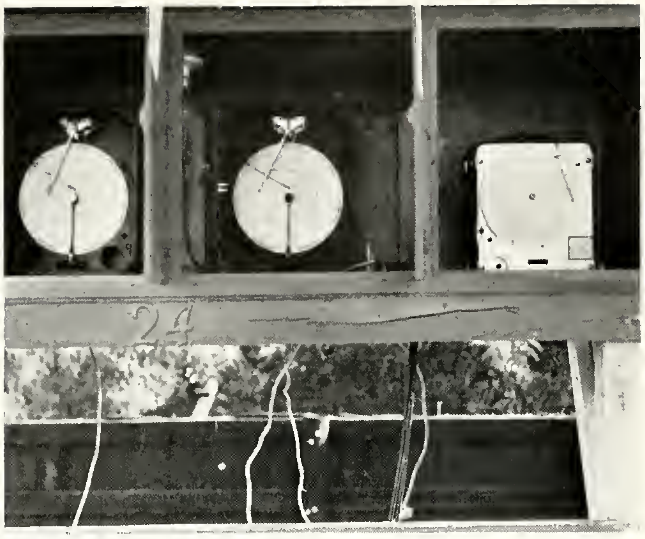


Fig. 3-SURFACE WINDS - GRAND TERRE MARINE LABORATORY



Electronic instruments for continuous recording of salinity and temperature.

south winds were predominant in March, April, May, June, July and August, with April having the greatest winds from the south.

Although south winds were the predominant winds in February of 1962, strong south winds did not arrive until April of 1962, whereas strong south winds arrived in March of 1963. During the spring months of March, April and May in 1963, there were 15 percent greater southerly winds than occurred during this same period in 1962.

In 1962, east winds, northeast to southeast, were strongest in November: through September of 1963, east winds were strongest in September. West winds, southwest to northwest, were strongest in June of both 1962 and 1963. The calmest month for both years, considering all wind directions, was June.

The following table compares the percentage of total winds from January through September of 1962 for each direction with those of 1963:

	Per Cent	
Direction	*1962*	*1963*
North-Northeast	17	15
Northeast-East	9	10
East-Southeast	12	14
Southeast-South	21	17
South-Southwest	15	19
Southwest-West	6	8
West-Northwest	6	5
Northwest-North	14	12

D. TIDES

Water movement is essential to the various marine organisms inhabiting water bodies. The movement of water serves as a means of transportation for marine animals, plants and nutrients, and is constantly changing the already extremely complex world of the marine dweller.

Tidal currents provide the force for the exchange of waters between Barataria Bay and the open Gulf. This necessary "flushing" of the bay is a daily occurrence although not all of the bay waters are exchanged each day; the amoun of water brought in and out of the bay depend primarily on the velocity and range of the tide As water is drained from the bay, it is taken away from the area by offshore currents and on the next incoming tide, "new" water is brough into the bay.

Because of this direct and important relationship between tidal movement and marine life, a six year tidal cycle was studied on a continuous basis. An analysis of this study which began in 1958 showed that the tides at Barataria Pass are diurnal, and each day the tides average 63 minutes later than the previous day. The greatest variations in these tides are caused by the positions of the sun and moon in relation to each other and to the earth. Neap tides, range of only a few inches, occur when the moon is over the equator, while spring tides, maximum range of 10 to 12 inches, occur when the moon is in its northern position. The change in range is not abrupt, but decreases and increases gradually requiring approximately a fortnight for the maximum range to decrease to a minimum range and increase to the maximum again.

Winds tend to augment or hinder tides, depending on the direction and speed of the wind. During northers, the sea level rises for a short time, as the bay waters are not able to enter the Gulf through the narrow passes as rapidly as the water builds up against the southern chain of islands. After this initial rapid increase in sea level, it then decreases as bay waters enter the Gulf. Strong southerly winds cause a rise in sea level in Barataria Bay, and because of the shape of the southern shore and passes, southeast winds bring higher tides than do southwest winds.

High atmospheric pressure and strong north winds associated with the numerous cold fronts

Current meter used in study of water flow and velocity.

during the winter months result in the lowest sea levels. During the summer months, fluctuations in atmospheric pressures are not as great, and there is a corresponding decrease in tidal variations, except during the infrequent tropical storms and hurricanes. Sea levels are highest during August, September and October, due primarily to the strong prevailing southerly winds during these months.

The highest tides recorded at Grand Terre since December of 1958 were those associated with the passage of Hurricane Carla during September of 1961. Although the eye of Carla passed many miles to the south of Grand Terre, the water level here rose to 43.7 inches above mean sea level on the 10th of September, with wave crests much higher. The lowest sea level recorded at Grand Terre occurred on December 21, 1960, when the water level reached a low of -25.7 inches below mean sea level. The barometric pressure reached a high of 30.50 inches of mercury on December 21, 1960, and on September 10, 1961, the barometric pressure reached a low of 29.70 inches of mercury during Hurricane Carla.

Tidal currents range from less than 0.1 knot to slightly more than 3 knots in Barataria Pass—the stronger currents occurring during the greater tidal ranges and just before high and low tide.

Tidal records have been kept at the laboratory continuously since December of 1958. From 1958 through 1962, these records show the following: the mean high tide was 12.44 inches above mean sea level, mean low was 1.43 inches, mean range was 10.99 inches, and mean sea level was 6.95 inches.

The following are monthly averages through 1962: all readings are in inches measured from mean sea level.

	Mean Range	*Mean High*	*Mean Low*	*Mean Sea Level*
Jan.	12.02	7.67	—4.35	1.68
Feb.	10.62	9.84	— .78	4.53
March	10.81	11.83	1.02	6.42
April	10.61	10.78	.43	5.60
May	11.74	12.97	1.24	7.11
June	11.86	14.02	2.16	8.09
July	11.12	12.71	1.59	7.15
Aug.	9.65	15.83	6.18	11.08
Sept.	10.59	19.96	9.37	14.68
Oct.	6.69	14.41	4.72	12.75
Nov.	11.55	11.67	.13	5.91
Dec.	11.70	7.53	—4.17	1.68

E. EFFECTS OF THE MISSISSIPPI RIVER AND RAINFALL ON THE SALINITIES OF BARATARIA BAY

In the usual sense of the word, an estuary is a passage where river currents meet the tide. Applying this definition to our state, most of the southeastern Louisiana coast is an estuary, as river water, particularly those waters from the Mississippi and Atchafalaya Rivers, retain most of their fresh water characteristics long after they leave their land area channels and enter the Gulf.

Rain and river water are fresh, that is, these contain very little or no salts, whereas Gulf waters are very saline. In areas where there is no fresh water dilution, the salinity of the Gulf of Mexico is relatively constant. In coastal bays such as Barataria, saline Gulf waters are mixed with fresh waters which drain into the bay from the marshes and bayous to the north, thus cre-

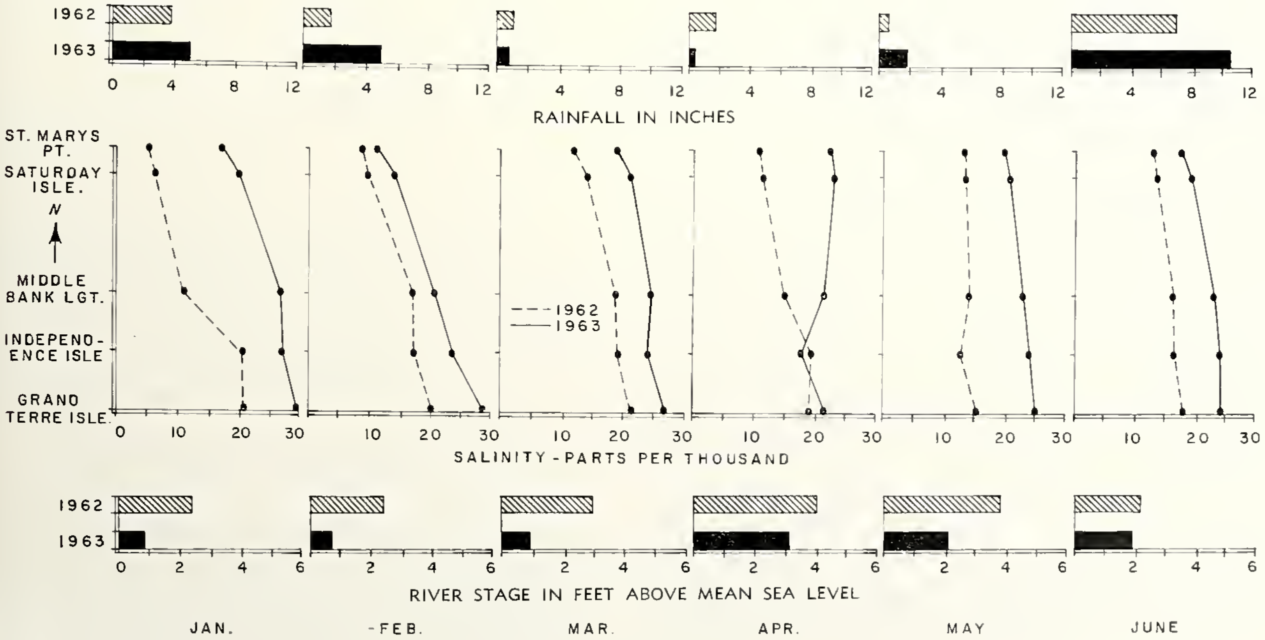


Fig. 4a- BARATARIA BAY SALINITY PROFILES

Continuous recording salinity apparatus for determining salinity gradients in bay waters.

ating an environment which is neither fresh nor highly saline as waters of the open Gulf. Because of the shallow depth of the bay, averaging approximately six feet, Gulf and fresh waters quickly lose their identity because of mixing. Therefore, there is no definite, stable line demarking fresh water from Gulf waters.

The factors affecting the salinities in Barataria Bay are numerous and complex; however an attempt has been made at the laboratory to correlate salinities in the southern part of the bay using only river stages, and those in the northern bay using only rainfall. It was found that rainfall does not appreciably affect southern bay salinities, but it does affect salinities in the northern bay. There is a direct correlation between river stage and salinities in the southern bay. Stages of the Mississippi River at Head of Passes were used, and as it is 60 miles from Head of Passes to Grand Terre, a 15 day time-lag was employed so that south bay salinities would closer coincide with the arrival of river water. The 15 day lag was used as this is the average time required for the spring flood waters of the Mississippi River to dilute the waters in Southern Barataria Bay.

Bay sea level, currents, wind direction and velocity play an important role in influencing salinities in Barataria Bay. Southwesterly winds bring highly saline Gulf waters into the bay while southeasterly winds, particularly during high river stages, bring low salinity waters into the bay. When sea level is low in the bay, salinities are lowered in the northern region as fresh water can more readily enter the bay from the north because it flows to a lower level. In the south bay, low sea level indicates that there is not a great deal of saline Gulf waters entering the bay, and the fresh water from the north is having a greater effect on the salinities of the southern bay than would occur during high sea level.

A comparison of north-south Barataria Bay salinity profiles of 1962 is made with the first eight months of 1963 in Figure 4. The 1962 and 1963 river stages are shown on the left and rainfall on the right. The rainfall is the average rain falling in this section of southeastern Louisiana during the month. The river stage is the average height of the Mississippi River at Head of Passes for the first 15 days of the month shown and the last 15 days of the previous

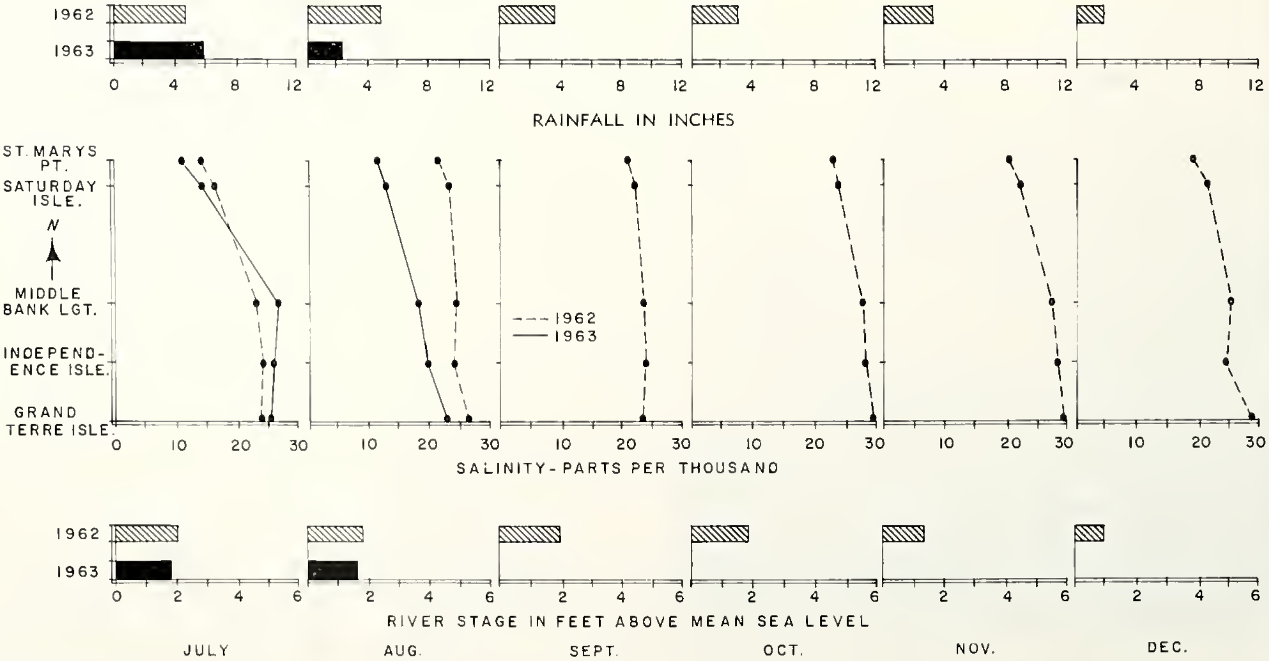


Fig. 4b- BARATARIA BAY SALINITY PROFILES

month. Although there is a direct correlation of river stage and salinity in the southern area of Barataria Bay, the correlation of rainfall with salinity in the northern part of the bay is not as direct. This is because the river influences the northern bay salinities, but to a lesser degree than does rainfall.

The average monthly Mississippi River stage in 1962 was 2.32 feet above mean sea level at Head of Passes, and the average monthly salinity at Grand Terre during 1962 was 22.8 ppt. Through August of 1963, the average monthly river stage was 1.63 feet above mean sea level, and the average monthly salinity at Grand Terre was 25.5 ppt in 1963. The average monthly rainfall in the southeast section of Louisiana during 1962 was 3.90 inches, and the monthly average salinity at St. Mary's Point was 15.1 ppt. The average monthly rainfall through August of 1963 was 3.99 inches and the monthly average salinity at St. Mary's Point during 1963 was 16.0 ppt.

A comparison of monthly river stages during both years shows that all monthly average river stages in 1963 were lower than those in 1962, and all Grand Terre salinities were higher in 1963 than in 1962 except during August. The lower salinity in August of 1963 is probably due to the low sea level during that month. The sea level during August of 1962 was 11.3 inches above mean sea level, and the sea level during August of 1963 was 5.9 inches above mean sea level.

The salinities at St. Mary's Point during 1963 have been higher than those in 1962 except in July and August. The discrepancy in August is probably due to the 6 inch higher sea level in 1962. The lower salinity in 1963 during July can be attributed to heavy rainfall during June and July of 1963.

The reversal from decreasing salinity from South to North to increasing salinity in April of 1963 is due to the low rainfall in March and April.

In the future, with a better understanding of currents, salinities in Barataria Bay could be predicted in advance with a workable degree of accuracy. It is preferable to use river discharge rather than river stage at Head of Passes, but at this time that information is not available to us.

II. SERVICES TO THE OYSTERMEN

The Louisiana Wild Life and Fisheries Commission performs many services in assisting the individual oysterman and the oyster industry in general. Direct assistance is given the oysterman when he experiences damage to his oysters or oyster bottoms. This assistance is usually in the form of a physical examination of his lease in an effort to determine the cause and extent of damage. Equipment such as depth sounding instruments, coring tubes, transits, diving gear, tongs, cameras and boats are used in examining damaged leases in the field. If pollution is suspected, facilities at the Commission's L. S. U. laboratory are used to determine the hydrocarbon content of the water and mud on the lease. Oysters are taken to the Marine Laboratory from the damaged lease where they are measured and a mortality count is made. When field examinations suggest continued study, one or more samples of these oysters are placed in wire baskets suspended in water at the laboratory where they may be checked periodically to determine several factors including what mortalities occur away from the damaged lease. Tests for the Fungus, *Dermocystidium marinum,* are also made at the lab.

Oysters taken from damaged reef are examined by biological aide.

During the 1962-63 period, 27 complaints, totaling 1166 acres on 44 leases were made. The accompanying table shows that damage due to silting and dredging and from tug and barge operations continues to be the chief cause of damage. Although the percentage of these types of damage has increased from the previous time period, the number of complaints has decreased. Pollution, which was the second and third major cause of damage during the previous time periods, is fourth during the 1962-63 period, and the number of pollution complaints decreased 75 percent since the 1960-61 period.

Core sampler is used by hydrographer to determine amount of sedimentation on oyster lease.

OYSTER DAMAGE COMPLAINTS

1962-63

Type of damage	*Number*	*Percent*
Seismic Operations	0	0
Silting and dredging	14	51.85
Oily taste in oysters (pollution)	2	7.40
Ecological changes	0	0
Exam. prior to dredging	1	3.70
Unknown causes	3	11.11
No damage found	0	0
Tug and barge damage	7	25.92
TOTAL	27	99.98

III. SEISMIC STUDY

A discussion of the seismic effects in the deep offshore area of the Gulf was published in the 1954-55, 6th Biennial Report. This article concluded that the damage to the water bottom from suspended charges 15 feet or more above bottom were negligible. In an effort to determine the effects of suspended charges in the shallow inshore waters, tests were made during the early part of 1963 with the cooperation of the Gulf Oil Corporation.

A scaled profile of an area in Chandeleur Sound where 50 pound suspended charges of Nitro Carbo Nitrate were detonated is shown in Figure 5. The salinity of the water was 28.1 ppt. and the water temperature was 85° F. The top 6 inches of the water bottom was 60% sand, 10% shell fragments, and 30% silt and clay. The charges were detonated in 10 feet of water over a relatively level bottom. Although the depth of the blast hole was accurately determined, the width is only an approximation as accurate horizontal measurements are difficult with depth sounding equipment unless the speed of the boat and current are known. Three dead fish were found in the vicinity of the explosions. The water was slightly turbid prior to the detonation, and it was extremely so afterwards which prevented successful physical examination of the blast holes.

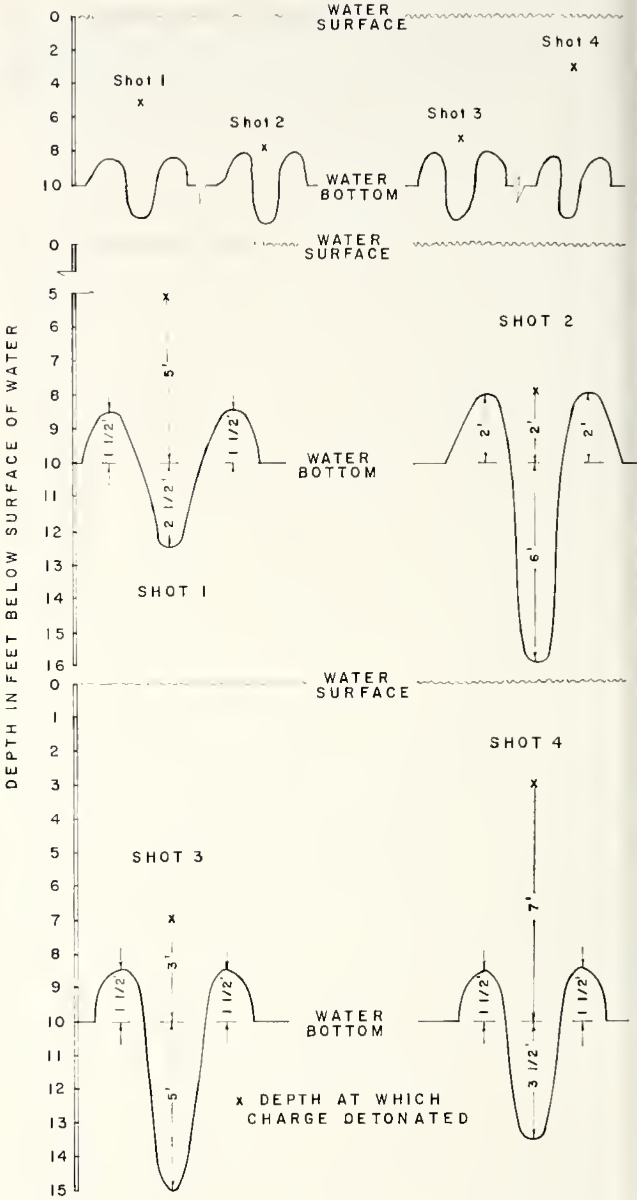


Fig. 5-DIAGRAMATIC SKETCH OF HOLE PROFILE FROM SEISMOGRAPHIC CHARGES

The following are the results of four suspended explosions in 10 feet of water:

Station	*Depth Exploded Above Water Bottom*	*Depth of Hole*	*Height of Mound*
1	5 ft.	2½ft.	1½ft.
2	2 ft.	6 ft.	2 ft.
3	3 ft.	5 ft.	1½ft.
4	7 ft.	3½ft.	1½ft.

It is apparent from the above results that in very shallow water, the closer the charge to the bottom, the deeper the blast hole. The deeper hole made by the charge 7 feet above the water bottom than the one 5 feet above the water bottom could be due to the physical characteristics of explosions in water or because the fathometer was not run over the deepest part of the hole at Station No. 1.

The blast holes are extremely steep-sloped, and therefore will soon be filled. However, the mounds around the edges of the holes may not reduce to the level of the surrounding water bottom. If part of the mound remains, the "hump" would interfere with oyster dredging operations.

IV. CHANNEL PROJECTS

As Louisiana and its industries grow, shorter and more efficient routes of transportation for men and materials are desired and promoted by various interests. In the marshland where there are very few roads and no railroads along the coastal region, bayous and channels are used extensively for transportation. These water passages have to be broadened and deepened to keep up with larger and deeper draft boats. Since these channels are usually dug in silt, which is unstable, the maintenance is great.

As the dredged channels are usually deeper than the surrounding water bottoms and link bodies of water which were not previously connected, the channels may introduce fresh water to areas which are saline or saline water to fresh water areas. Channels and their spoil banks tend to alter direction and speed of currents, cutting off nutrient supplies to some areas and increasing this supply in other areas. The spoil dug from the channels greatly increases the turbidity of the near-by water, and changes of currents may increase the rate of erosion and/or aggradation.

For the above reasons, studies are made of the channel dredging operations and the resulting environmental changes.

The following are some of the major waterways presently under study by this Division of the Louisiana Wild Life and Fisheries Commission:

A. HOUMA NAVIGATION CHANNEL

This channel, which connects the Intracoastal Waterway at Houma with the Gulf of Mexico, was dug to a depth of —15 feet and a width of 150 feet. The channel was completed in 1962.

Saline Gulf waters are carried northward along this channel to the town of Houma, where it has caused some adverse effects to the city's water supply.

Personnel at the Marine Laboratory have been studying the channel and the surrounding waters in an effort to determine the salinity changes caused by the channel. Figure 6 illustrates the surface isohalines taken on October 1, 1963 during an out-going tide. As can be seen from the map, the channel on this particular day has brought saline waters up the channel towards Houma 12 to 15 miles northward of equivalent salinities to the west. A distinct salt water wedge was not found in the channel because of the heavy ship traffic which keeps the waters mixed.

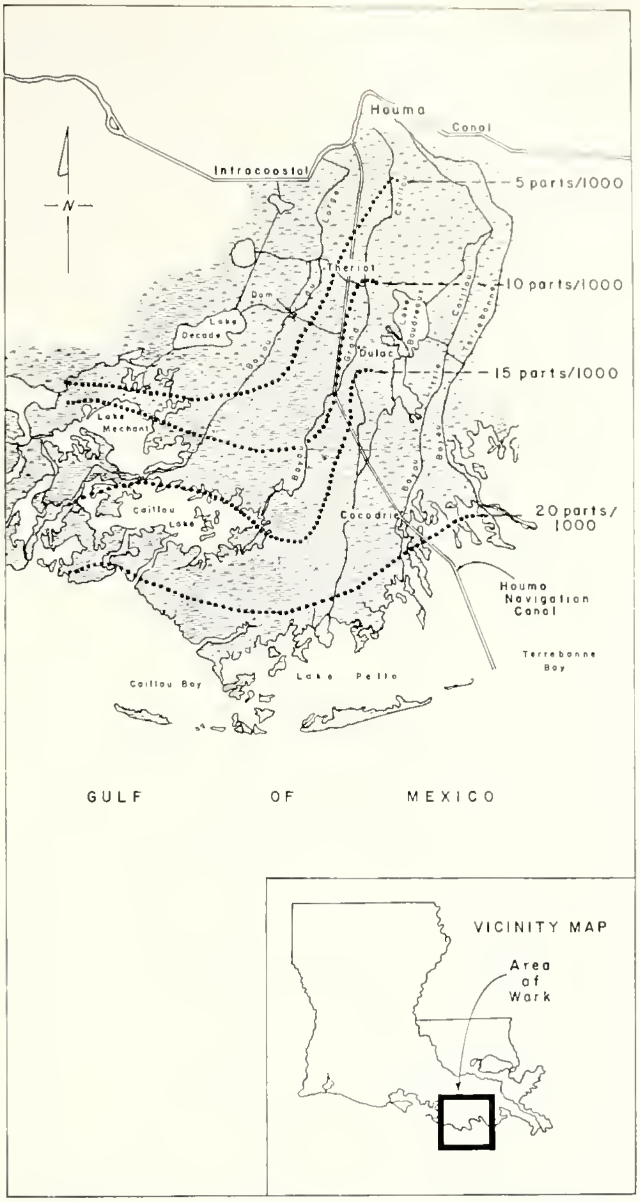


Fig. 6-ISOHALINE MAP OF THE HOUMA NAVIGATION CANAL AND VICINITY

A dam was constructed where Bayou du Large intersects Falgout Canal. The dam has prevented saline waters from the navigation channel from entering Bayou du Large and Lake De Cade. Salinities on the eastern side (channel side) of the dam are between five and nine ppt higher than those on the west side of the dam, which does not receive any water from the channel. When the dam is removed, the resulting salinity changes, particularly in the oyster growing areas, will be studied. If the changes are adverse to the oyster industry, the prior studies will aid in determining remedial measures.

B. BARATARIA BAY WATERWAY

This channel, which connects the Intracoastal Waterway at New Orleans with the Gulf of Mexico in the vicinity of Grand Isle, was dug to a depth of —12 feet and a width of 125 feet. The channel was completed in November of 1963.

The effects of this channel on the environment of Barataria Bay are presently being studied. Suggestions for the location of the final alignment and dredging procedures were offered by this Commission in cooperation with the U. S. Fish and Wildlife Service which were generally adopted by the U. S. Army Corps of Engineers and Louisiana Department of Public Works which are expected to minimize ecological changes with respect to the scope of this project. The spoil banks were staggered, allowing east and west currents to pass through the spoil, and, when possible, the spoil was deposited on the land area, which limited spreading of the silt.

There has been some damage to oysters in the area of dredging due to changing currents and siltation. Oyster leases were bought for the channel right of way, and these leases have been taken out of production permanently.

The area of the channel has been studied for the past nine months. Silt falling out of suspension was measured, and the results of this short-term study indicated that the sediment laden waters near the dredging operations were confined generally in a north-south direction and were not spread over a large area. Additional observations will be made.

Salinities were taken in the channel and adjacent areas. There have been no drastic salinity changes, however the salinities on the western side of the channel are 3 to 4 ppt higher than those to the east. A 3 to 4 ppt salinity difference is critical only in this oyster growing region at the lower salinities, i.e. 15 ppt and lower. It is at this low to medium range salinity that ecological changes and the presence or absence of the oyster predator, *Thais haemostoma*, becomes critical. The salinity difference may be caused by the deflection of the fresh water from Bayou Cutler to the east, and the channel water to the west. There is a minor salt water wedge in the channel varying from one to five ppt from top to bottom.

The reasons for the minor salinity changes caused by this channel relate to the deep breaks in the spoil banks, the relatively shallow depth of the channel, and the large amount of open water traversed by the channel.

The drastic salinity changes caused by the Houma Navigation Channel are due primarily to the location of the channel which was dredged, for the most part, through land area. The absence of large intersecting water bodies from Bayou Petit Caillou to Houma allows the Gul waters to travel to Houma without any appreciable dilution. The Barataria Bay Waterway wa dug through existing large bodies of wate which flow over the channel causing the channel water to lose its identity. Also, the Houm Channel is three feet deeper than the Batatari Bay Waterway, which aids in bringing salin waters to the north.

C. MISSISSIPPI RIVER—GULF OUTLET

This channel, which connects the Mississipp River via the Intracoastal Waterway at New Orleans with Breton Sound and the Gulf of Mexico, was dug to a depth of —40 feet and a widt of 500 feet.

The Louisiana Wild Life and Fisheries Commission presently has a contract with the U. S Fish and Wild Life Service for performing hydrographic sampling in the Mississippi River Gulf Outlet Project area. Salinities, tides, currents, water temperatures, and bathymetri recordings are made in this channel and the surrounding area to determine what changes in water conditions have and are taking place.

V. FUTURE HYDROGRAPHICAL AND GEOLOGICAL PROJECTS

With the addition of more sophisticated equipment, an extensive and detailed hydrographi and geologic program is planned for the coming year. The following is a generalized description of these proposed projects:

A. PASSES

1. Install tide gauges in the three passe joining Caminada and Barataria Bays wit the Gulf.
2. Current and bottom sediment studies.
3. Determination of volume of water exchange.
4. Surface and bathymetric mapping.
5. Determine horizontal and vertical salinit and temperature gradients.

B. OFFSHORE

1. Utilization of offshore oil platforms fo instrument locations in order to study th ecology of the shrimp spawning areas.
2. Salinity, temperature, bathymetric an current studies of the near offshore are to determine Mississippi River effects an direction and speed of flow.

C. INSHORE AREAS

1. Install additional temperature and salinit meters.
2. Current velocity studies and increase sampling.

I. SHRIMP RESEARCH

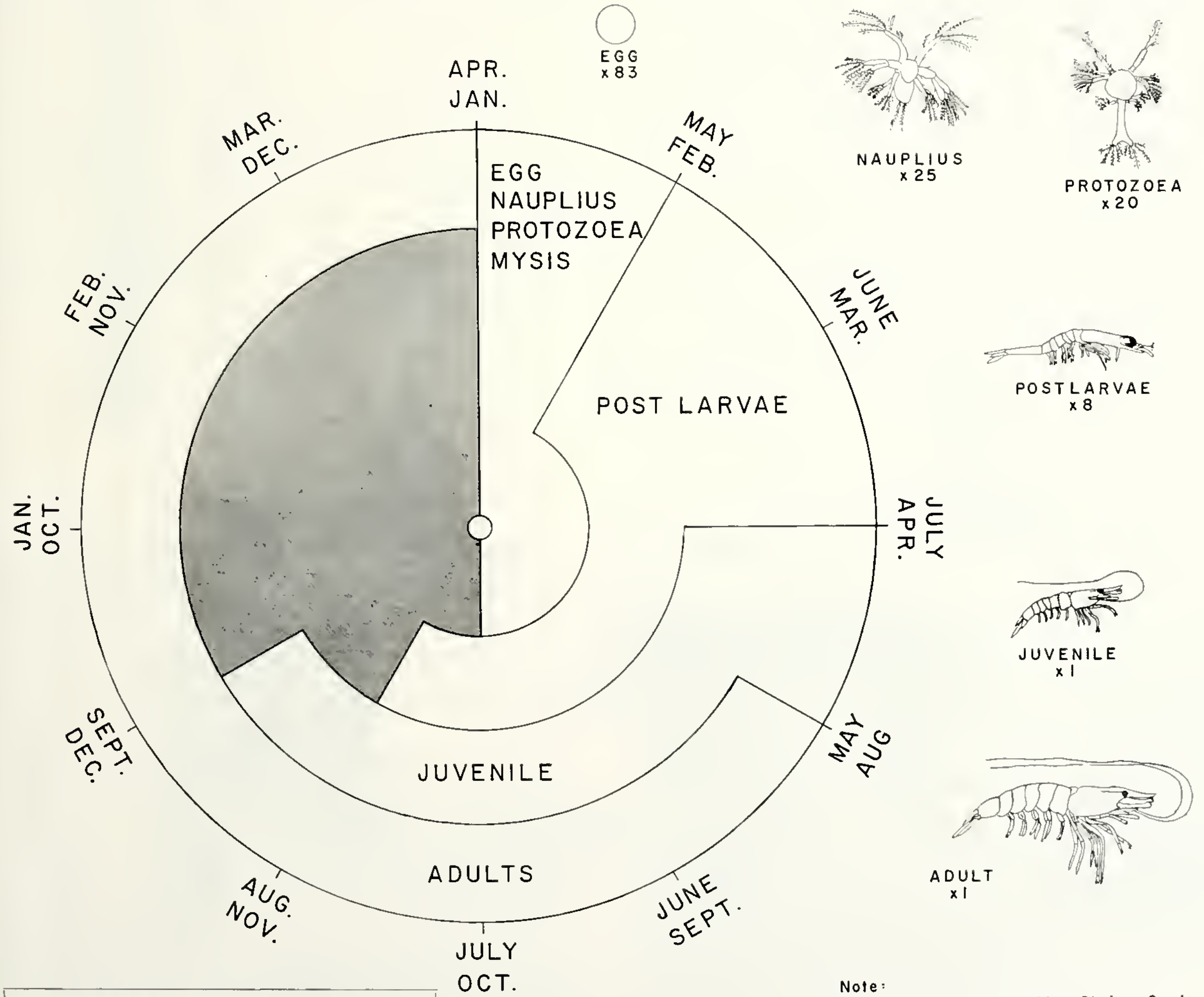
Recent declines in shrimp production in the northern Gulf of Mexico have resulted in a great impetus in shrimp research by state and federal agencies. For the first time in the history of the shrimp industry enough funds have become available to support shrimp research of sufficient magnitude to supply data in quantity and quality in advance of each year's production. The importance of this fact cannot be over emphasized. Since shrimp are biologically short lived (probably not more than 1.5 years), they are capable of high rates of reproduction and rapid growth. Annual population densities in animals of this type are primarily dependent on the hatching of thousands of eggs per female and the survival of a large number of the young each year. (See life cycle chart)

This simply means that the annual harvest of shrimp is dependent on the success or failure of each breeding and growing season. It is therefore evident that, if each year's harvest is to be handled in an intelligent manner based on technical facts, the necessary research and data analysis must be accomplished annually in the few months of the breeding and growing season in order that conditions in the forthcoming season may be evaluated.

During the past three years shrimp research in the northern Gulf has been coordinated and carried out by state and federal agencies at a level which for the first time has made adequate data available in time to apply to each year's production.

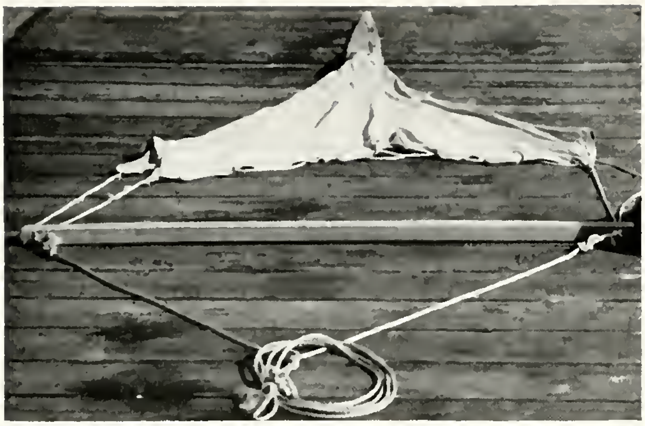
These data are now being applied annually in the prediction of the shrimp harvest, the setting of seasons, and the general management of the shrimp population.

Basically the shrimp research program carried out by the biological section is geared to gather those types of data which can be analyzed and rapidly used by the industry. Successes in postlarval sampling procedures and the determination of juvenile shrimp distribution, growth rates and densities has led to reasonably accurate predictions of each annual shrimp harvest. Outlined in the following discussion are the general procedures and results obtained from



Reduced Five times from original drawing

Note:
Outside date represents White Shrimp Cycle
Inside date represents Brown Shrimp Cycle



Standard postlarval sampling net—six foot postlarval beam trawl.

studies during the 1962 and 1963 shrimp season. It is believed that this type of research should continue on an annual basis and be refined as experience is gained. It is also evident that many other studies should be carried out and it is contemplated that new and varied projects will be added to the general research program as time and budget considerations allow.

A. POSTLARVAL STUDIES

1. Field Operations

It has been demonstrated by the U. S. Fish and Wildlife Service personnel that the sampling of population densities of shrimp during the postlarval stage of their life cycle could furnish information usable in predicting the forthcoming annual crop. Postlarvae, ranging in length from 10 to 20 mm. usually occur in abundance in the passes leading to inside waters as they move from the offshore breeding grounds to inshore nursery areas. The general procedure in making postlarval density studies is to sample a series of fixed stations with standardized gear The data when analyzed, tabulated or plotted in graphs tend to indicate the relative abundance of larval shrimp arriving in the nursery areas and reflects the abundance of the forthcoming production.

The postlarval studies reported here are designed to give the most reliable type of data consistant with methods used. Various methods of sampling were also examined to determine their reliability and efficiency. Studies were also designed to determine as much as possible about postlarval activity, density and movements.

In an effort to gain more data in order to increase the reliability of knowledge about recruitment into coastal marsh areas, sampling in 1963 was greatly increased over 1962. All sampling was done in accordance with standard procedures set up by the Gulf Shrimp Biological Research Committee of the Gulf States Marine Fisheries Commission. The data thus obtained, along with parallel studies, i.e., hydrographic data, allied work by other agencies, provided valuable information which was used in predicting the year's probable shrimp production.

In addition to concerted efforts in the Barataria Bay region, other areas of the coast were sampled. To compare conditions on the east side of the Mississippi River, weekly samples are taken in the Grand Pass area and sent to the Marine Lab for analysis. In March of 1963, prior to the opening of the Spring shrimp season, samples were taken in the Marsh Island-Sabine Lake area in southwestern Louisiana. These

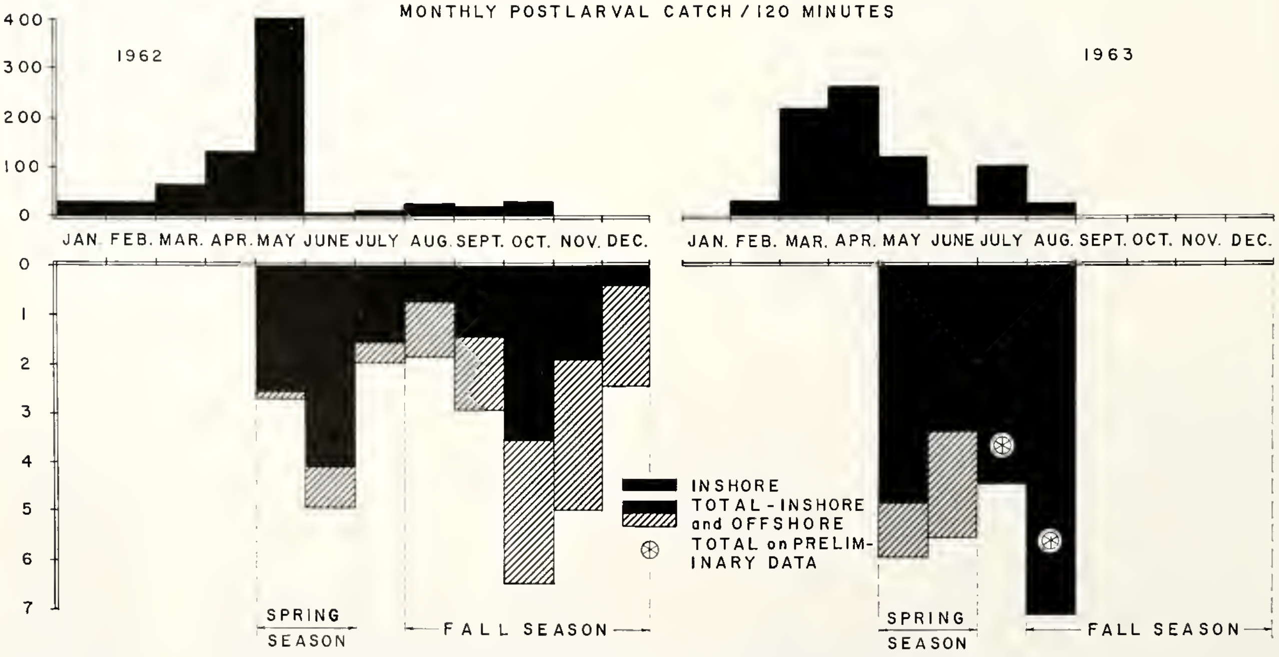


Fig. 1 - COMPARISON OF MONTHLY POSTLAVAL CATCH / SHRIMP LANDINGS

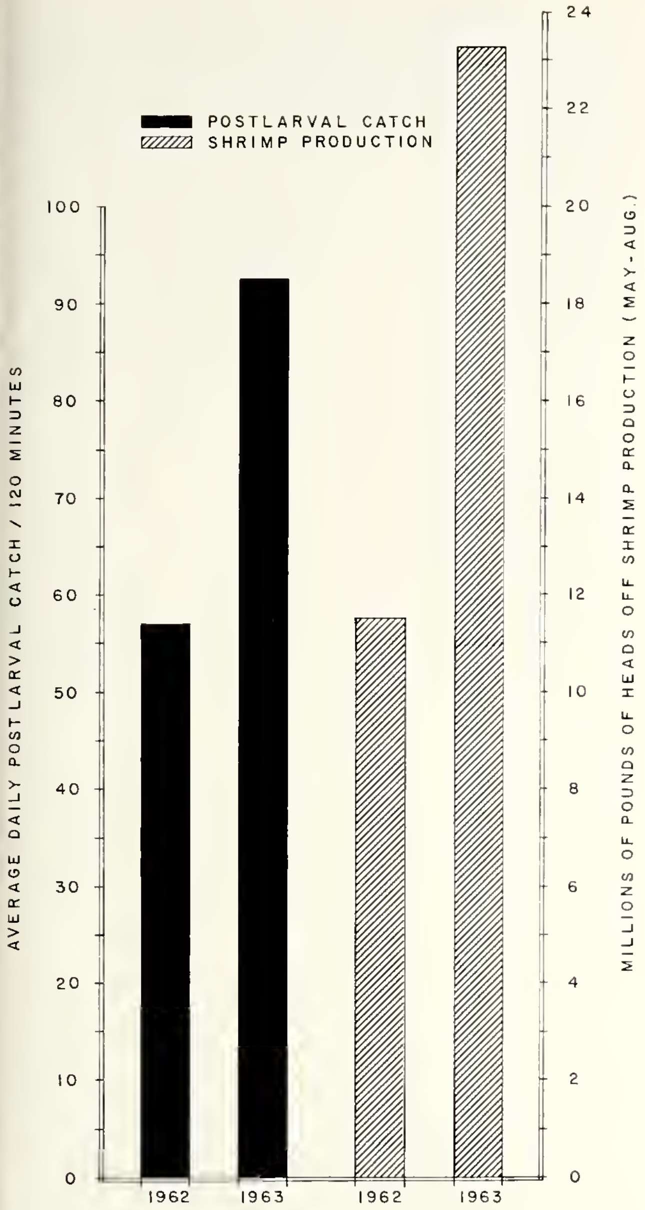


Fig. 2- COMPARISON OF POSTLARVAL DENSITY AND SHRIMP PRODUCTION: 1962 and 1963

samples gave an indication of the good Spring season which was enjoyed throughout the entire Louisiana coast.

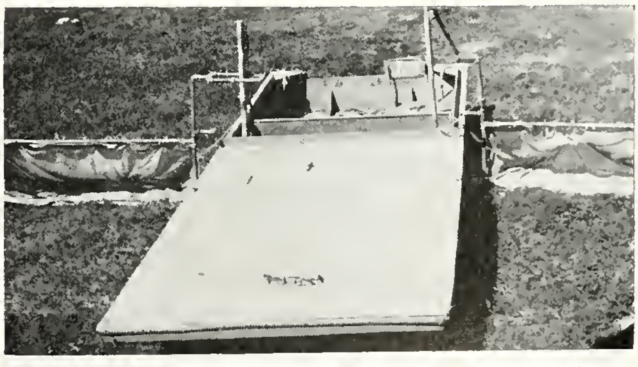
The intensified postlarval sampling program prior to both the Spring and Fall seasons was valuable in predicting the good 1962 harvest and the obviously better 1963 harvest.

Inspection of the shrimp landings (Figs. 1 and 2) show that production appeared to be higher (and now confirmed though complete landings data were not available at this time of preparation) in 1963 than in 1962. There was a 62% increase during the period from January to July 1963, over the same period in 1962. The sharp increases in production during each May reflects the opening of the trawling season for inside waters. It may be noted also that the catch of postlarvae prior to the 1962 Spring season and the 1963 Spring and Fall seasons give proportional information to the density of the shrimp population as is witnessed by the landings during the respective seasons. While the monthly postlarval data for 1962 show a greater abundance of postlarvae at some periods, the 1963 data show a greater population density. The 1963 program which concentrated on sampling of the passes proved that less intensive sampling of the passes and more sampling of inside stations in 1962 produced less reliable information about postlarval recruitment.

In addition to conventional sampling methods, new ideas and methods were tested at the marine lab. The use of a floatplane is presently underway to test the feasibility of expediently sampling the major passes along the coast where the preponderance of postlarval shrimp recruitment apparently occurs. This experiment, along with the "beach test" method is explained elsewhere.

Gear research was carried out in 1963 in several different ways. To determine the best type of plankton net to use in the postlarval sampling program, a 6 foot beam plankton net and a 0.5 meter met, (see photo) much like the Gulf "V" net, were compared. These comparisons may be observed in Table I. Because the beam trawl fishes roughly four times the water area of the 0.5 meter net and catches more consistently, it was decided to use the beam net exclusively for inshore sampling.

Another experiment was devised and conducted by one of the Biological Aides at the lab. This involved the use of plankton "wing" nets. Two 6 ft. beam plankton nets were rigged on either side of a 14 ft. "Batteau" (see photo). The nets were allowed to fish at the top of the water with the boat tied in mid-channel and facing the tidal flow. Results were satisfactory and this method is used regularly to secure live postlarvae for experimental use.



Flat barge equipped with modified plankton beam trawl for collecting large quantities of postlarval shrimp.

Table I

POSTLARVAL CATCH DATA
FOR 0.5 METER AND 6 FOOT BEAM NETS

Station	*Time in Minutes*		*Catch*		*Unit Effort**	
Nets	0.5 M.	Beam	0.5 M.	Beam	0.5 M.	Beam
Caminada	290	300	89	393	36.77	157.20
Barataria	290	300	24	294	9.92	117.60
4 Bayous	300	300	17	75	6.80	30.00
TOTALS	880	900	130	762	17.81	101.60

*Unit effort is given as catch/120 minutes

Nets	*Catch Percent-ages*	*Area of Mouth Openings*
Beam	60.34%	4,713.45 Cm.^{2}
0.5 M.	39.66%	1,963.60 Cm.^{2}

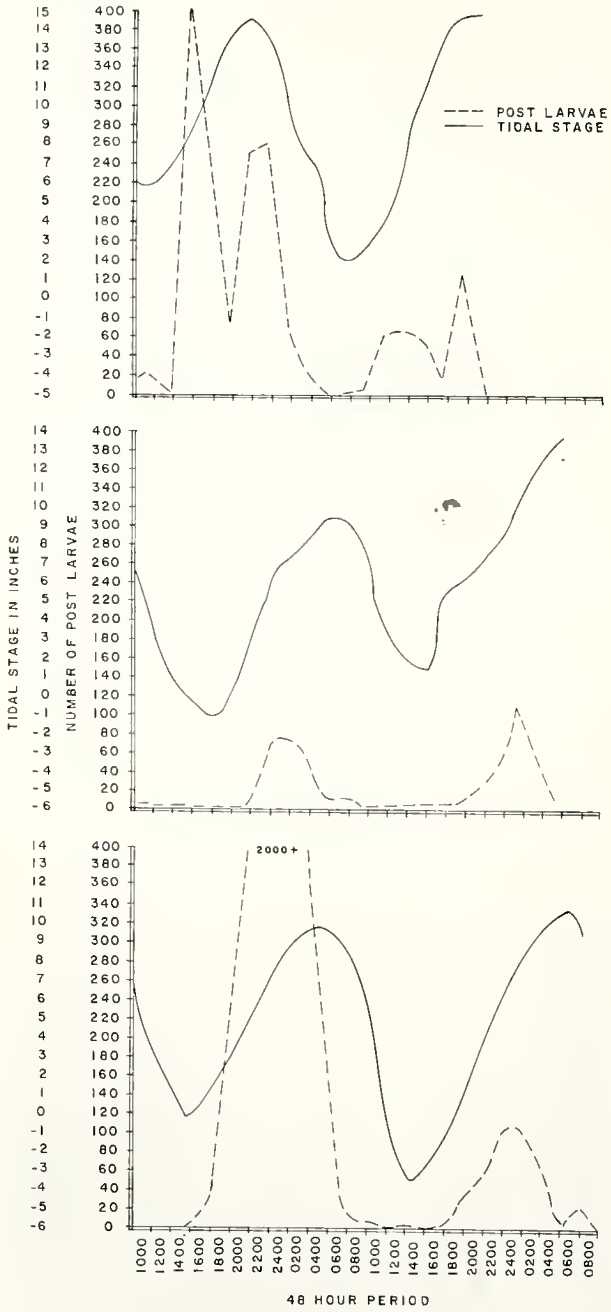


Fig. 3- COMPARISON OF TIDAL CYCLE AND POSTLARVAL CATCHES

2. Postlarval Tidal Correlation

During the month of July 1963, three separate forty-eight hour experimental tests were undertaken. An attempt was made to show the correlation between tidal stages and postlarval recruitment.

In this series, which was conducted in Caminada Pass, a ten-minute sample was taken every two hours. A new type of plankton net developed by personnel at the Marine Laboratory was used for this test. This net (see photo) is a modified version of the beam plankton net used in other sampling programs. There is one exception however; this particular net is fished in a stationary position from a boat anchored in the pass. The postlarvae are swept into the net by the tidal flow of the incoming and outgoing waters of the pass.

The results obtained are given in Figure 3, and demonstrate the influence played by the tidal currents. In each case it is obvious that the postlarvae are greatly dependent on the tidal influxes. These tests reveal a substantial amount of recruitment during periods of incoming waters.

A study of the outgoing or falling tide shows a relatively small amount of postlarvae evident in the sample. Apparently, some of these individuals are swept back into the Gulf. This further indicates the inability of postlarvae to enter inside waters against an out-going tide. Previous tests conducted at low tidal stages further strengthens this assumption.

It may be assumed through these and other tests previously conducted that postlarval recruitment begins midway between low and high incoming tide, and continues to the peak of this same high tide. This means that the period from 50% to high tide is the one which could be expected to provide the greatest recruitment. The period where the lowest recruitment can be expected is that one beginning midway between high and low outgoing tide to low tide.

It should be stated that the new net used for this series of tests, although very proficient, did have its shortcomings. It seemed that during periods of slack tide, the net was rendered useless because there was insufficient current to keep the net fishing and no sample was obtained. These slack periods accounted for only 4 to 5 hours out of every 48 hour test and were considered to be inconsequential.

3. Flight Sample Study

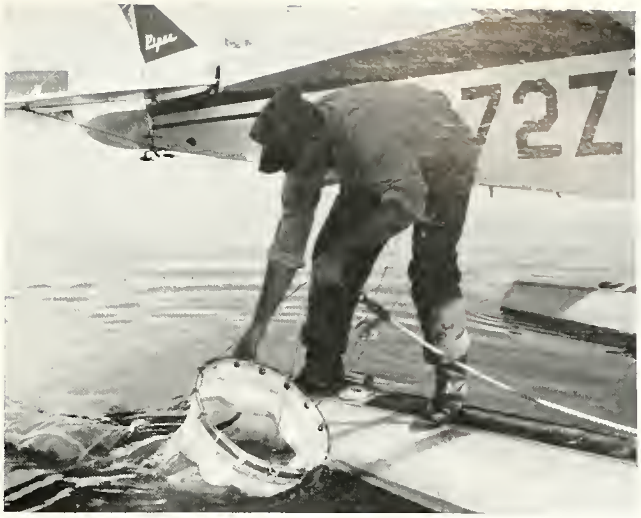
A new approach to postlarval sampling is now in progress at the Marine Laboratory. This method utilizes an airplane on floats in securing plankton samples from various passes along the central Louisiana coast. The new system under study would enable the laboratory personnel, in time, to project to a limited degree the postlarval profile of the entire coast.

The studies thus far conducted have been a weekly flight of approximately 100 miles, from the laboratory west to Point-au-Fer (Figure 4). A total of four 10 minute samples are taken on each flight. The first station is Grand Pass Timbalier through which Timbalier Bay connects with the Gulf. Second is Wine Island Pass, the main artery for Terrebonne Bay and Lake Pelto. The third station is the mouth of Bayou Grand Caillou, believed to be one of the main openings through which postlarvae are fed to the marsh areas of that region. The fourth, and final station is located at Point-au-Fer, at the southern reaches of the Atchafalaya Bay.

These samples are collected with a cone shaped plankton net with a 0.5 meter opening (see photo). This net is pulled between and slightly behind the pontoons of the plane as it taxis at a relatively slow speed across the surface of the pass. The salinity and temperature are also recorded at each station.

The first phase of this study covers a period from June 3 to August 20 and is represented by nine flights. The results, though preliminary, were of value to the biological staff. Table 2 gives a complete breakdown on the flight study.

The future plan for the flight sampling project calls for a weekly trip from the Texas to the Mississippi line with samples being taken from all the major passes between these two points. Previously the scope of such an operation was too immense to be considered. A recent comparison of a boat to an airplane for this study showed the plane much more acceptable for the work. To examplify this, the investigation shows that the survey conducted by the airplane in a total of four hours would have taken no less than 30 consecutive hours to complete by boat.



Biologist raises half meter plankton net during flight sampling test for postlarval shrimp.

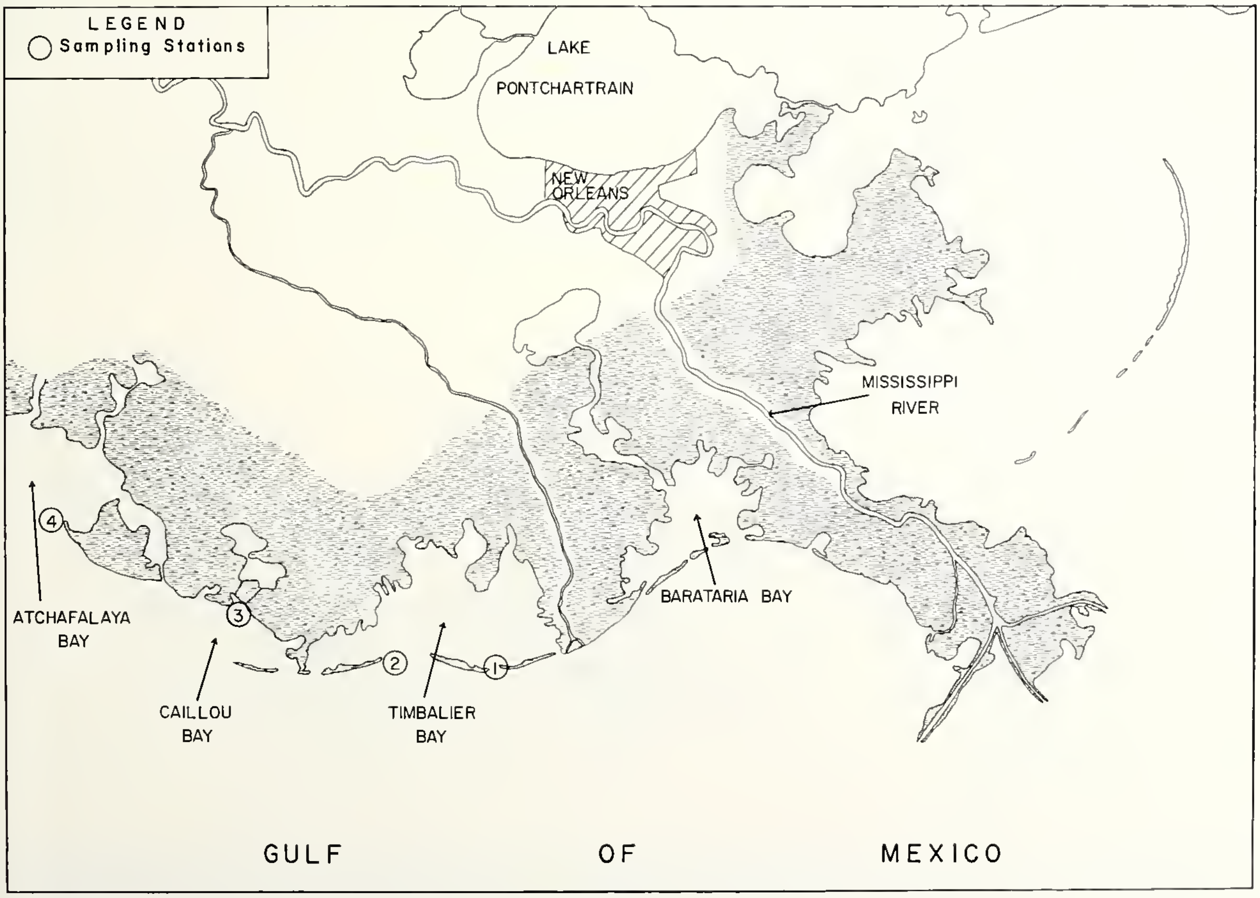


Fig 4 - FLOAT PLANE POSTLARVAL SHRIMP SAMPLING STATIONS

On a man-day basis, the trip by boat would require 10 man-days labor as compared to one man-day by plane. The cost for this trip by boat results in a total expense of 300 dollars, requires a week to complete, and in the end, supplies the same data that may be obtained in a matter of four hours at an expense of 30 dollars when made in an airplane. This cost does not include maintenance or depreciation of either boat or plane. Should the Marine Laboratory obtain a floatplane, it would help provide a more complete and comprehensive picture of the shrimp population of the entire coast.

Table 2
FLIGHT SAMPLE DATA
Postlarval Catch

	1963 Stations			
	1	*2*	*3*	*4*
June				
3	0	0	0	0
10	0	0	0	14
24	6	0	..	1
July				
1	1	0	1	0
8	0	0	23	1
15	0	0	0	0
22	0	16	0	0
August				
12	0	0	0	9
20	2	0	0	105

4. Beach Test

The method being used by the U. S. Fish and Wild Life Service to sample postlarval recruitment, density, and distribution is the "beach test". This technique was tried by Grand Terre laboratory personnel to determine its value in the research program.

The beach test employs a beam plankton net, 150 feet of line and a wooden stake. The stake is pushed into the ground at the waters edge and one end of the line is attached to it. The plankton net is tied to the other end and pulled in a half circle around the stake. In the shallow water near the shore the person pulling the net usually does not get wet above the waist.

The results of this method of sampling proved roughly equal to the boat-tow methods now used at the Marine Laboratory.

The beach test is limited in application because of soft waterbottoms and inaccessibility of shallow sample areas. Because of these limiting factors this sampling technique is not planned for immediate use by the Marine Laboratory.

5. Postlarval Conclusions

Conclusions for the postlarval work for the period 1962 and 1963 may be summarized as follows:

1. Reliable information on the recruitment of postlarvae into the coastal nursery areas may be obtained by the daily sampling of major passes along the coast.
2. The best time for obtaining postlarval specimens is midway between low and high incoming tides and continuing until peak high tide.
3. The information based upon postlarval sampling may be used as an index of the seasonal commercial catch.
4. The use of a floatplane can be a useful and economical means of sampling large areas in short periods of time.
5. The "beach test" may be employed as an alternate method of postlarval sampling.
6. A six-foot beam plankton net is more efficient in postlarval sampling from small boats than is a 0.5 meter Gulf "V" type plankton net.

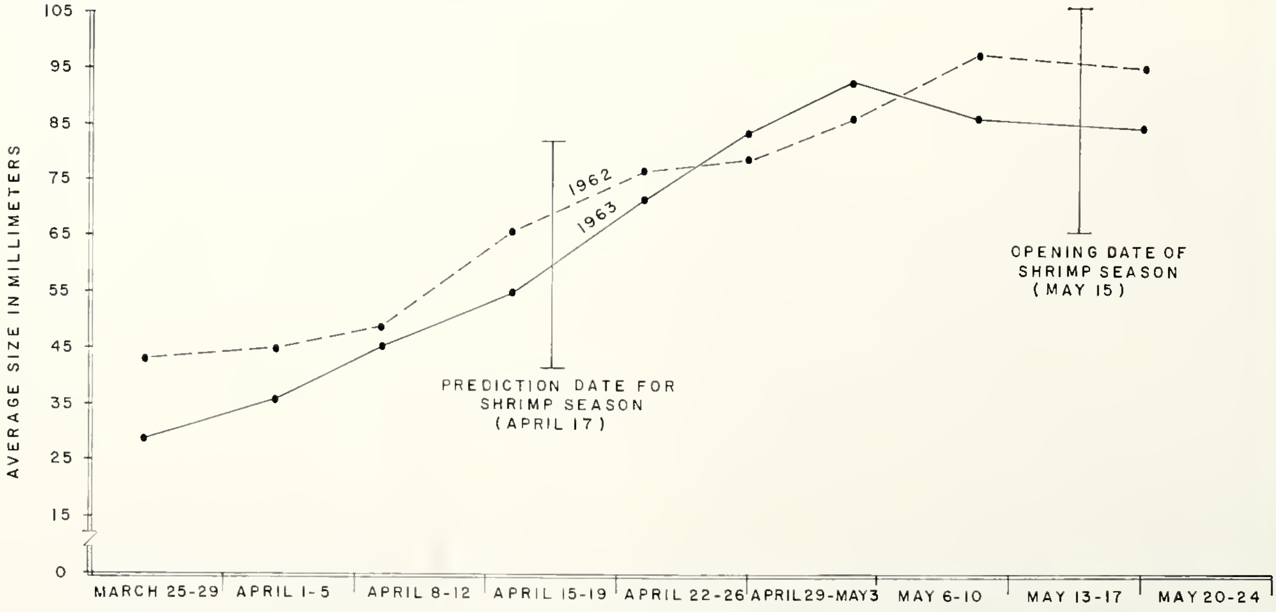


Fig.5 - COMPARISON OF JUVENILE BROWN SHRIMP GROWTH RATES: 1962 and 1963

B. JUVENILE STUDIES

1. Brown Shrimp

The postlarval shrimp enter the bay areas throughout the late winter and early spring. These shrimp show little or no growth in the cold waters of the nursery areas and apparently the population builds with each incoming tide. When the water in nursery areas begins to warm in the spring and the temperature approaches 70° F., usually the last week in March, the shrimp begin to grow at a rapid rate (Figure 5). From this time of initial rapid growth until the opening of the fishing season an intensive sampling program is made by the personnel of the Marine Laboratory. This program is carried out primarily to determine the following: 1. The rate of growth. 2. The population density. 3. The dispersal of the population. 4. The opening date of the fishing season that will best utilize the existing shrimp population. This information is then presented and interpreted to the shrimp industry at an annual meeting with the Louisiana Shrimp Association and other interested parties prior to making recommendations for the opening date to the Commission for its action—the setting of the spring shrimp season.

The juvenile shrimp sampling program was initiated in the spring of 1962 and expanded in 1963. Field crews were sent into the marsh with small mesh trawls and a large number of samples were made in each bay system. Figure 6 shows the 255 stations made in 1962 and Figure 7 the 427 stations made in 1963. In 1962, 22 thousand shrimp were caught and processed in the months of March, April and May, while 49 thousand shrimp were treated similarly in 1963. All of the shrimp were brought to the laboratory, separated according to species, and measured. In 1962 over eight thousand brown shrimp were measured into size groups and weighed. This gave a workable length-weight relationship for future use. Figure 5 shows the average size shrimp caught each week in the sample trawls. From these data the growth rates of 1.7 millimeters per day in 1962 and 1.4 millimeters per day in 1963 were determined. In accordance with this difference between growth rates, specific contributory factors are suggested and these aspects will be studied more intensively in our continuing shrimp research program.

Standardized test trawl lowered for sampling.

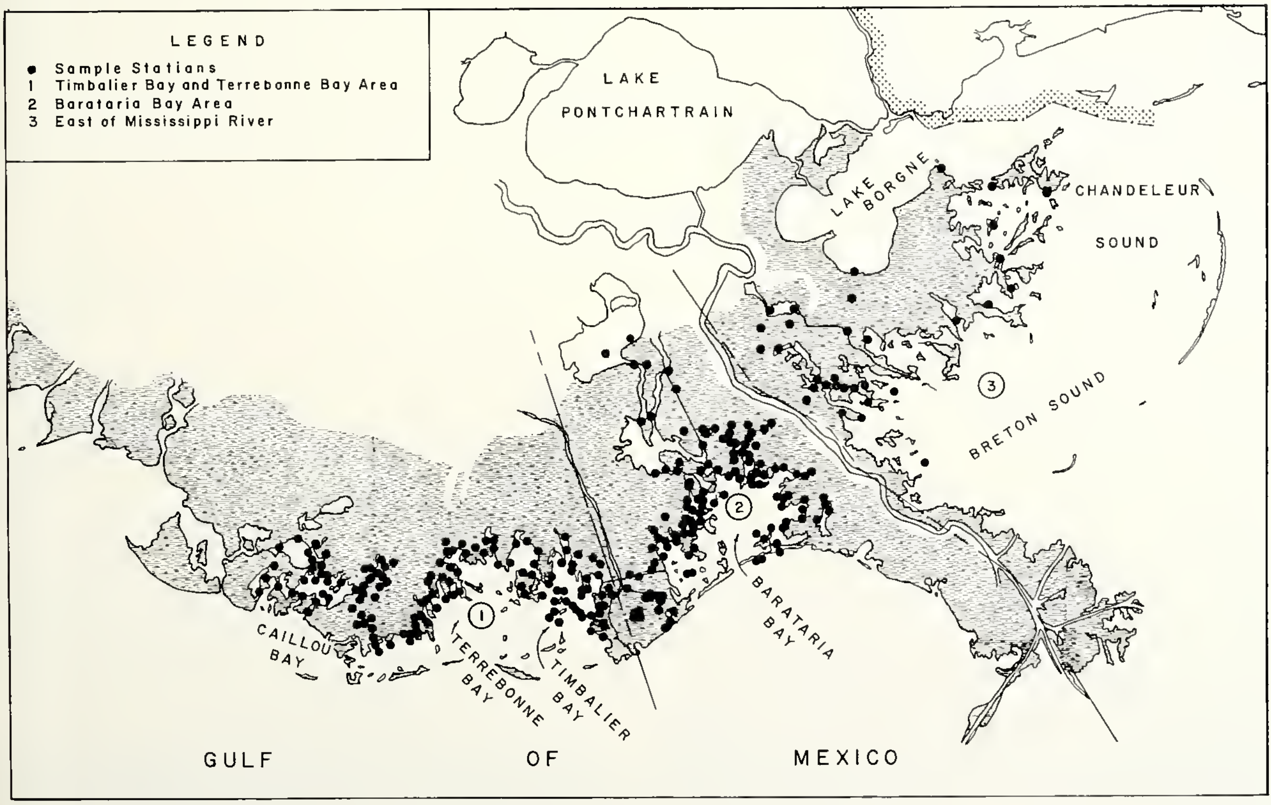


Fig. 6- BROWN SHRIMP (*Penaeus aztecus*) SAMPLING STATIONS: 1962

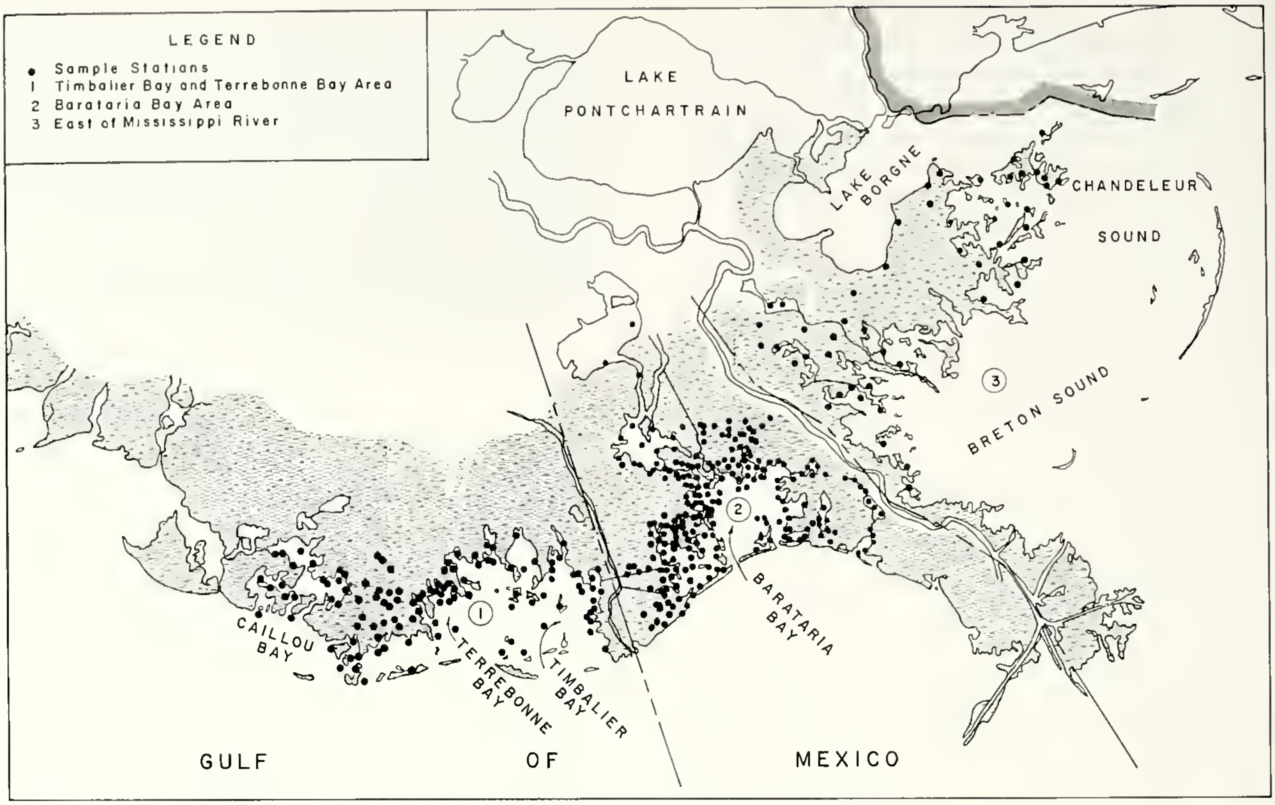


Fig. 7- BROWN SHRIMP (*Penaeus aztecus*) SAMPLING STATIONS: 1963

These growth rates were projected and used to show the size of shrimp that would be available on the earliest possible opening date of the fishing season, May 1, which can be fixed by the Commission between May 1 and May 15 in accordance with state laws. Figure 8 shows three curves representing the 1963 shrimp population using the projected growth rate. It may be seen from this series of curves that only 24 percent of the shrimp would be over 100 count on May 8 but 96 percent would be over 100 count by May 22. This demonstrates that by delaying the opening of the season only two weeks, the fisherman would be able to increase his catch of larger shrimp by 72 percent.

The amount of harvestable shrimp in a population (Figure 9) is important not only to the fishermen but the entire industry as well. If the population is fished too early, a large number of shrimp may be caught, but the poundage will be low. This would remove a large part of the crop before it had reached its maximum yield from the inshore shrimping grounds. This method of predicting the shrimp population characteristics was used in 1962 as well as 1963; accordingly, recommendations were made to the Commission. Based upon these recommendations and possibly other considerations of the industry, the Commission fixed the opening dates for the spring shrimp seasons for both years as May 15, the latest possible date as provided under statutory authority.

In 1963, an attempt was made to determine the population density of juvenile brown shrimp. The average catch per sample (Figure 10) for 1963 was compared with the data already available for 1962. These curves indicate that 1963 had a relatively higher population than 1962. Attempts will be made in the future to devise a method to determine the weight and density of shrimp populations by sampling.

Several conclusions may be drawn from the 1962 and 1963 juvenile shrimp studies. They are the following:

1. Postlarval shrimp that enter the nursery grounds in the spring do not grow any appreciable amount until the waters begin to warm.
2. The temperature at which the shrimp begin rapid growth is near 70° F.
3. The growth rate of juvenile brown shrimp, between one and three inches in length, in the estuarine waters of the Louisiana coast was 1.7 millimeters per day in 1962 and 1.4 millimeters in 1963.
4. Projection of growth curves is a feasible method to predict population characteristics such as size and productivity.
5. Average catch is a relative index of population density.

2. White Shrimp

During the first week of July in 1962 and 1963, a second intensive shrimp survey was begun. This was an investigation of the white

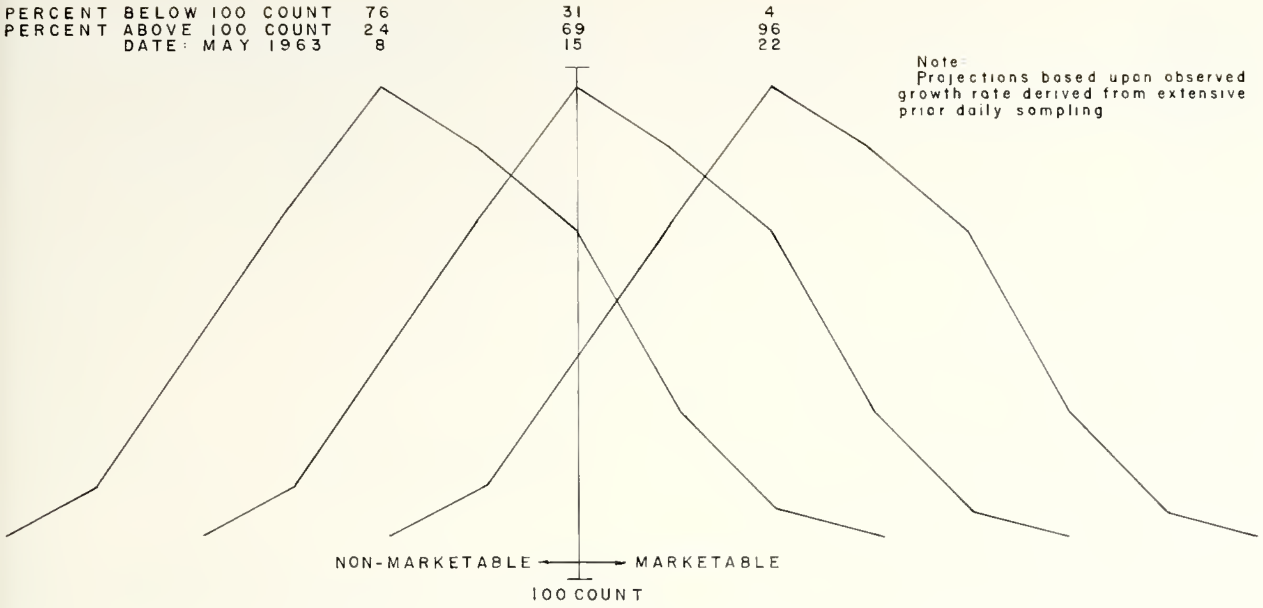


Fig. 8- DIAGRAMATIC PROJECTIONS OF POPULATION CURVES FOR MAY 1963 BROWN SHRIMP

shrimp population present in the bay areas near the Marine Laboratory. It was primarily an investigation of the densities and population dynamics of the shrimp. Since the fall season is fixed by law to open the third Monday in August, no recommendations concerning the most desirable opening date were required from the technical staff. The survey was conducted in the manner as that for the brown shrimp study, but on a somewhat smaller scale. Selected stations were sampled three times weekly and the specimens were counted and measured. A weekly growth rate was calculated and plotted. An attempt was made to project the relative size expected to be attained by the populations on opening day each year.

In addition to the dynamics study it was also determined that an improved technique is needed for white shrimp investigations in the future. Unlike the brown shrimp, these juveniles are somewhat more elusive and considerably more difficult to capture. They tend to school more, and more frequently. In many cases, an area was sampled and no catch was recorded; a sample made in the same place the following day may have produced hundreds of juveniles (this is generally not the case with brown shrimp). The data obtained from the investigation are inconsistent. They often tend to be somewhat erratic, making any successful prediction or projection much more difficult.

The personnel at the Marine Laboratory have

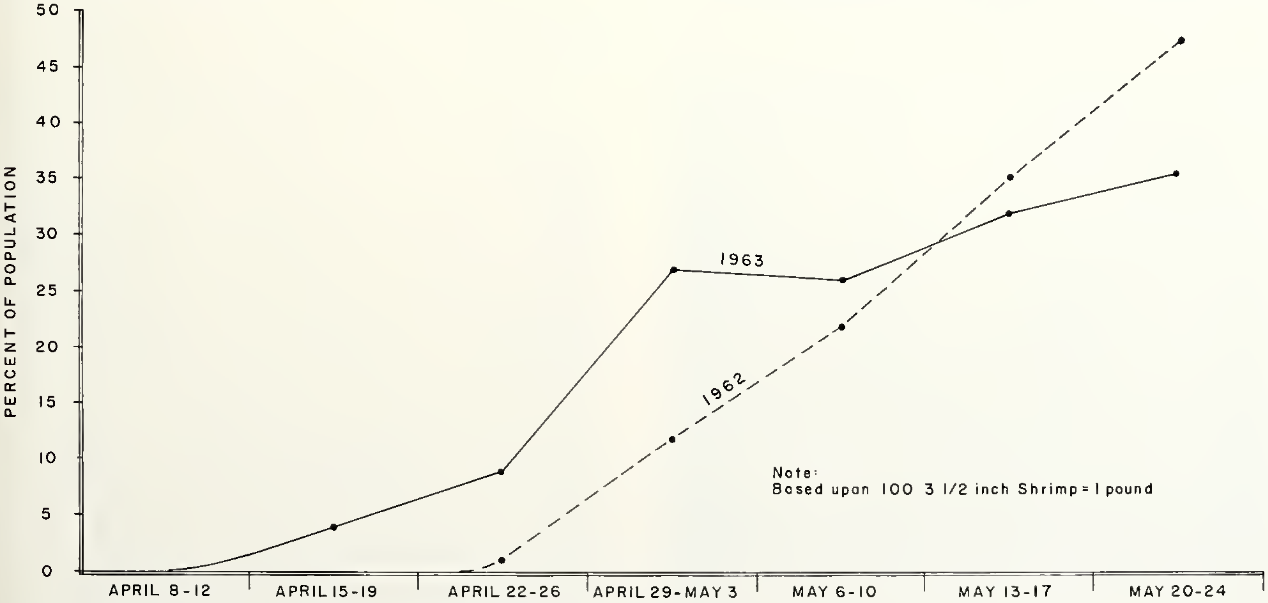


Fig. 9- HARVESTABLE SHRIMP IN POPULATION: APRIL-MAY

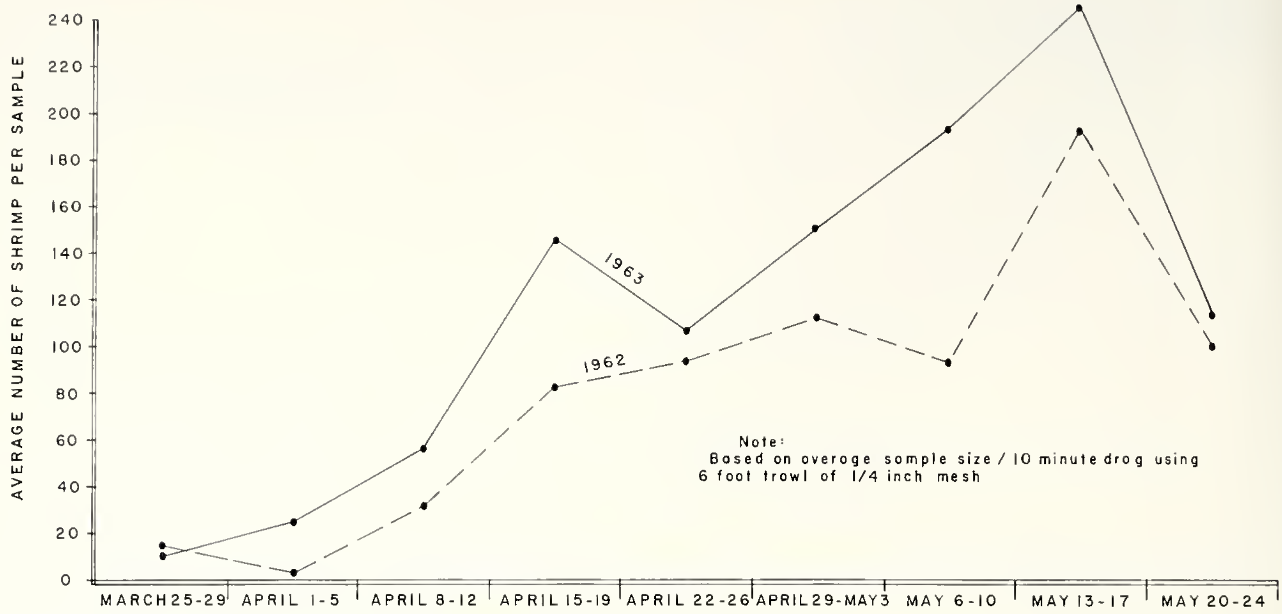


Fig. 10-COMPARISON OF JUVENILE SHRIMP DENSITIES: 1962 and 1963

new nets under development; experimental fishing with them may define methods which may eliminate or reduce some of the problems in white shrimp studies.

C. SUBADULT STUDIES

The sub-adults are, in this case, considered to be those shrimp which comprise the commercially harvestable populations of the inside waters. These studies were a continuation of a program that was instituted in September 1961. This two-year investigation was designed to provide information about the sub-adults of the bay area on a year-round basis. Emphasis was placed on occurrence, dispersal, movement, size, gonadal conditions, and hydrographic influences.

In selecting the sampling stations, an attempt was made to incorporate all of the known environmental conditions with which shrimp were associated in the Barataria Bay system. The conditions range from the deeper open waters to the shallow sluggish waters which extend well into the marshes.

After much consideration and study, sixteen stations were selected. They represented a favorable cross-section of the bay (Fugure 11). Each station was sampled at least once a week. A ten-minute trawl sample with a 10-foot otter trawl was run simultaneously with a 6 ft. beam plankton net. In addition to these samples, a bottom and top water salinity reading was made. Specimens obtained from these trawls were refrigerated in plastic bags until examined at the laboratory, where they were classified by species, sexed, and measured. All of these data are evaluated and entered in permanent records for future use.

Additional information is obtained from the daily reports of commercial shrimp landings, prepared by the Branch of Statistics, Bureau of Commercial Fisheries. These reports are helpful in confirming densities of sub-adults as determined by this sampling program.

This two-year sub-adult study terminated in August of 1963, after which these data were compiled and catalogued. This will be valuable for comparative purposes in the future. The total number of shrimp processed during this two-year study are summarized on a monthly basis and presented in Table No. 3.

Table 3

SHRIMP CATCH

September, 1961 to September, 1963

1961		
September	579	
October	3,061	
November	2,382	
December	1,269	
TOTAL		7,291
1962		
January	26	
February	34	
March	5,469	
April	9,338	
May	12,004	
June	4,800	
July	7,546	
August	2,790	
September	3,707	
October	5,338	
November	3,646	
December	416	
TOTAL		55,448
1963		
January	119	
February	42	
March	160	
April	32,062	
May	16,853	
June	3,856	
July	11,693	
August	2,699	
TOTAL		67,484
GRAND TOTAL		130,223

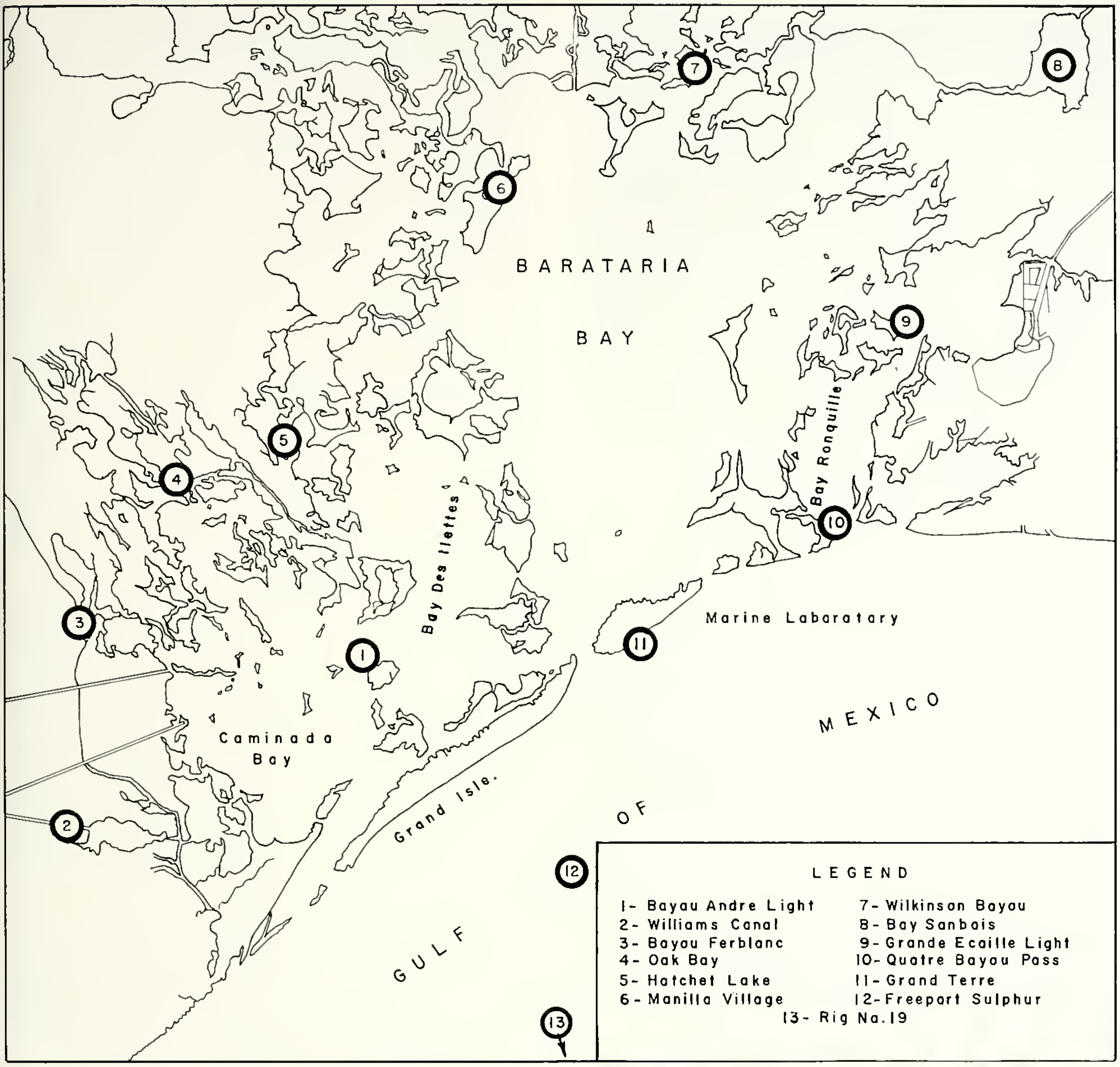


Fig. 11- BARATARIA BAY AREA SAMPLE STATIONS

East of Mississippi River

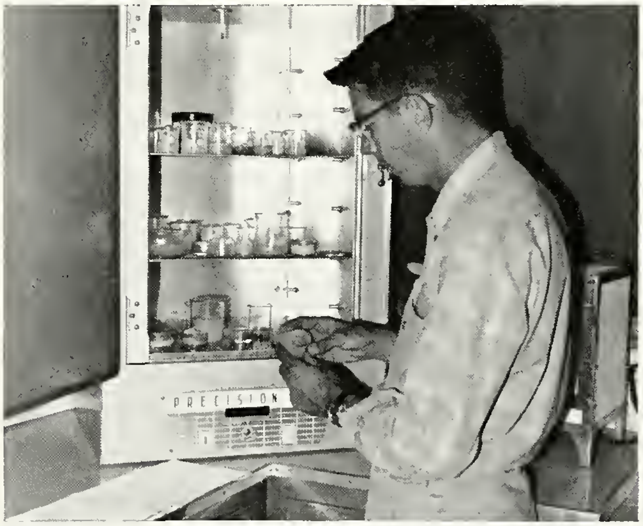
1962	
May	1,638
June	396
July	398
August	792
September	83
October	610
November	433
December	2
April, 1962	2,269
April, 1963	3,161

Cameron-Rockefeller Area

July, 1962	4,499
July, 1963	7,311

Timbalier-Terrebonne Area

April, 1962	5,661
April, 1963	4,938



Shrimp tissue being made into prepared slides for study.

D. ADULT STUDIES

Histology of Reproductive Organs

In an attempt to further our knowledge of the

Slides of shrimp gonads are studied to determine breeding activity.

reproductive cycle of penaeid shrimp, a gonadal study program is being continued.

Collection of specimens for this study has been rather haphazard. Either interested industry people or shrimp fishermen have brought in gravid specimens or the shrimp were caught by laboratory personnel working on the juvenile shrimp study. For the most part these shrimp have been in the advanced stages of spoiling when they were received at the laboratory. It is now planned to make weekly trawl samples offshore in about 5½ fathoms of water to obtain fresh specimens.

The shrimp caught will be measured, sexed, and examined to determine gonadal condition. If the gonads are mature or beginning to show signs of maturity, they will be removed and returned to the laboratory to be histologically prepared and microscopically examined.

Data kept on the condition of the gonad include its development, cell condition (in females, the presence or absence of large numbers of follicle cells) whether mitotic bodies are present, and whether the gonad is ripe or spent.

E. POND CULTIVATION STUDIES

Cultivation of shrimp in ponds may become a very profitable enterprize in this country in the future. In several countries of the Orient, shrimp are produced in ponds, both by natural and artificial stocking, and are profitably harvested in large quantities. This should be feasible in this country if the proper methods of cultivation can be determined.

In the winter of 1961-62 a ¼-acre pond was constructed near the laboratory on Grand Terre Island for preliminary pond cultivation studies. In the spring of 1962 juvenile brown shrimp, one to three inches in length, were caught in a small mesh trawl, counted, weighed, and stocked in the pond. Weekly samples were taken and the shrimp were weighed, measured and returned to the pond. Some handling mortalities occurred and were recorded. At the end of two months the pond was drained; the shrimp were removed, counted, weighed, and measured. The results (Table 4) were satisfactory in that a relatively large number of shrimp survived and grew. The pond was stocked with juvenile white shrimp in the fall. The fall stocking rate was decreased because of apparent overcrowding during the spring. The pond was sampled weekly and the shrimp showed a significant increase in growth when compared to those of the previous study. The pond was drained and the sampling results proved correct. The fall crop of white shrimp had more than doubled the growth rate of the spring crop of brown shrimp as demonstrated by the gain in pounds per acre per day (Table 4).

In the spring of 1963 the pond was stocked with postlarval, penaeid shrimp. These shrimp were caught with small mesh "wing" nets, separated from other planktonic forms and placed in the pond. At the end of 75 days the pond was drained, the shrimp measured and weighed. All of the shrimp recovered were brown shrimp. A heavier poundage was removed than in the spring of 1962 though there were fewer shrimp. In the fall of 1963 postlarval shrimp were again introduced into the pond. These shrimp were assumed to be mostly white, though such was not the case. When the pond was drained in October, only 14 percent were white shrimp, the rest being brown. As in the 1962 experiments the white shrimp grew at a faster rate than the browns.

From the preliminary experiments of 1962 and 1963 several conclusions may be drawn. First, pond cultivation would seem feasible since production varying from 75 to 200 pounds of shrimp per acre was obtained without supplement feeding. Second, white shrimp seem to be better suited for pond cultivation than brown shrimp.

Postlarvae are individually separated from sample in order to stock experimental ponds.

Third, the fast growth, as demonstrated by the gain per day, would make pond cultivation practical on a short term of multi-crop basis. Fourth, mortalities appear to be insignificant in these experiments in that they did not appreciably affect the population.

With the successful completion of the 1962 and 1963 experiments, an expanded pond study is being instituted at the Marine Laboratory. Materials have been acquired and construction has begun on six additional ¼-acre ponds. Four, 1/200-acre, concrete block holding tanks have been constructed beneath the main laboratory building and are ready for use. Two wintering ponds have been dug to depths of over 10 feet. These ponds will be used in conjunction with experiments concerning spawning, rearing, fertilization and feeding of shrimp.

Table 4
POND DATA
1962 and 1963

	1962		*1963*	
	Spring	*Fall*	*Spring*	*Fall*
Starting Date	4-6	8-22	3-22	8-6
Duration (days) ...	60	63	75	62
Ending Date	6-5	10-24	6-5	10-7
Stocking Rate/Acre	18,000	12,000	20,000	12,800
Recovered/Acre	13,216	10,352	8,992	7,960
Stocking Weight (lb)/ Acre	19.23	29.61	.....	.....
Recovered (lb)/Acre	79.88	201.48	145.00	76.80
Count Recovered ...	166	50	62	B-122 W-55
Gain: Pounds/ Acre/Day	1.01	2.73	1.93	1.24
Mortality Rate	26.24%	13.73%	55.04%	37.81%
Salinity Range 0/00.	23-26	26-35	32-35	23-35
Temperature Range-F	73-90	93-56	59-89	96-80

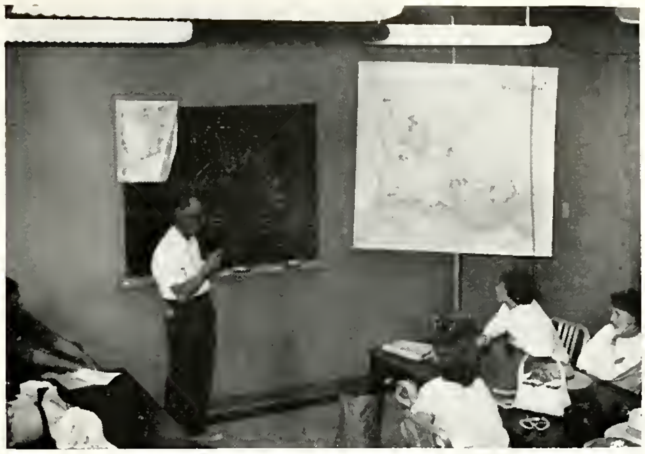
II. OFFSHORE FISH SURVEY

At present, investigations are underway at the Grand Terre Laboratory concerning fish populations around offshore oil and sulfur platforms.

The purposes of the investigations are:

1. To observe composition of species and population flucuations as related to seasons, temperature, turbidity, etc.
2. To observe behavior patterns of different fish species regarding schooling, feeding, fear and/or curiosity toward divers.
3. To observe and study the general ecology of the aquatic fauna associated with the platforms.

Project personnel are comprised of the regular crew of the M/V Marine Research which make scheduled weekly offshore salinity and plankton sampling trips. Upon completion of salinity and plankton sampling, the boat ties up to a platform, and SCUBA equipped divers go below, generally for one or two hours, to make observations and photographs. Unusual specimens are also taken with spearguns. Upon returning to the surface, observations are recorded on data sheets specifically used for this project and any specimens taken are preserved.



The marine laboratory's biological staff gives lectures on the ecology of coastal Louisiana to visiting classes.

Data sheets are also being prepared for distribution to interested local diving clubs in an attempt to supplement our data.

III. COOPERATIVE EDUCATIONAL PROGRAM

Many scientific groups including Universities, Colleges, High Schools, and Civic groups have been interested in visiting or studying at the Marine Laboratory in the past two years. Because of the great demand and interest in the Laboratory, a cooperative educational program was set up in 1960 and continued to the present time. The program in general falls into several categories as follows:

1. Visiting professional researchers who are furnished working space and equipment in order to carry out independent research.
2. Visiting University and College science classes actively working in marine biology or geology. Such groups are generally under the direction of their professors and the laboratory furnishes guided field collecting trips, lectures, visual education, and demonstrations of current research or local animals. Such trips are short term, one or two day events.
3. Visits from High School science classes and science clubs. These, like University classes are under the direction of their teachers. Laboratory personnel furnish the same program for High School groups as for University classes except the detail and complexity of the information offered is adjusted to the age level and experience of the group. In all cases, preference is given those High School classes whose teacher has previously attended an organized short course in marine biology at this or other laboratories.
4. A six day short course in marine biology is offered on two successive weeks in August for qualifying High School Teachers.

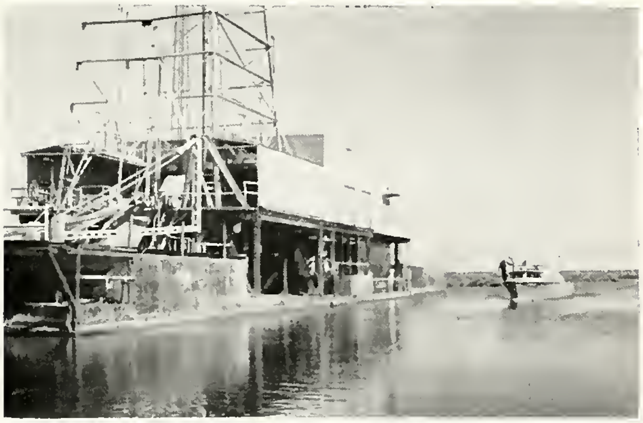
This course is in cooperation with the science section of the Louisiana Department of Education. Program planning is jointly arranged by laboratory and Department of Education personnel and the participating teachers are selected by the Education Department. The basic plan of the course not only includes intensive instruction to the High School teacher group but includes subsequent visits to the laboratory by the individual teachers and their classes. All interested parties should make inquiries and applications to Science Section, State Department of Education, Baton Rouge, La.

Coastal Waste Control

The purpose of this section is to prevent pollution of coastal waters and marshes. This is made possible by legislative act which designated the Louisiana Wild Life and Fisheries Commission as the agency and provided it with the authority to enforce the pollution laws of the State.

The routine functions of this section include inspections and surveillance of all drilling operations, production installations, storage and transportation of oil, gas and sulphur. These inspectional patrols are maintained over more than 300 miles of the Southeastern coastal area of Louisiana. This area includes that section of the State from the Mississippi-Louisiana State Line west to the Atchafalaya Bay Channel and for a distance of three miles offshore. Two inspectional teams consisting of an inspector and a boat captain, utilize two speed boats to patrol their respective territories. These boats are equipped with two-way radios and depth sounders. By use of radios the inspectors are in constant communication with all other units of the Louisiana Wild Life and Fisheries Commission including the New Orleans headquarters, thus allowing for immediate attention to pollutional complaints as reported.

Each installation is routinely checked for carelessness or negligence in complying with waste control regulations. Careful inspection is made of disposal devices, pipeline valve leaks, the barges used for crude oil transportation, loading racks, barge loading outlets, and similar operations in which spillage could occur.



Coastal waste unit Inspector boarding an oil drilling rig.

The most practical and feasible method of disposing of oil field waste in compliance with Stream Control Commission's regulations is by burning on the lease where the waste originates.

Activities for the Coastal Waste Control program are coordinated through the Division of Oysters, Water Bottoms, and Seafoods in the central office. Inspectors report weekly to file summaries of the past week's activity, to file samples, reports, and photographs, and to receive regular traffic procedure for the week.

Coastal Waste Control officers often use commission aircraft to locate pollution conditions and to patrol areas in which possible pollution has been reported.

Due to continuous patrol and strict enforcement of Coastal Waste Regulations, violations have been reduced to a minimum.

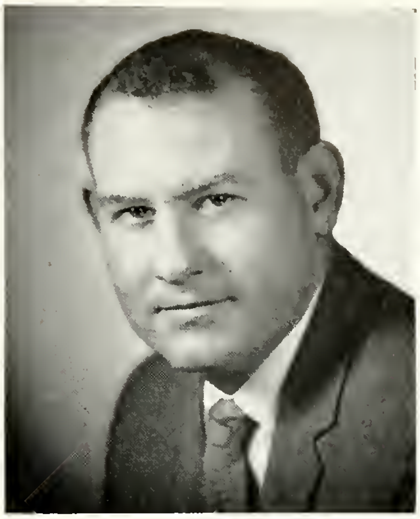
Coastal Waste Control personnel try to prevent pollution not only by constant inspections of commercial installations, but also by educating operators in the necessity for the proper disposition of harmful waste products.

Operators in the patrolled areas have been cooperative with the commission in its attempt to control pollution. Most of the violations are the result of carelessness and are corrected within a reasonable length of time. The inspectors often lend ideas to help correct various problems and strive to cooperate with the operators. However, immediate corrections of the Stream Control Commission violations are mandatory.

Because of the transfer and shifting of personnel in the oil and sulphur industries, the education and inspection program is unending for the Coastal Waste Control unit.

Extra details performed in cooperation with other divisions indicate consideration of additional equipment and personnel to keep pace with increased demands upon the Coastal Waste Control section.

Refuge Division



ALLAN ENSMINGER
Chief

We are pleased to report that excellent progress has been made during the past two years in the development of the five coastal marsh wildlife refuges and public hunting areas, which comprise almost 250,000 acres of state-owned land. These include the 83,000 acre Rockefeller Wildlife Refuge in Cameron and Vermilion Parishes, the 83,000 acre Marsh Island Wildlife Refuge in Iberia Parish, the 66,000 acre Pass-a-Loutre Waterfowl Management Area in Plaquemines Parish, the 15,000 acre State Wildlife Refuge in Vermilion Parish, and the Coulee Wildlife Refuge of 3,500 acres in Morehouse Parish in north Louisiana.

During the past two years significant increases in usage by migratory waterfowl on the coastal refuges has been noted. Nearly forty percent of the world's blue goose population used these areas at different times during the winter months along with up to fifteen percent of the Mississippi Flyway's wintering duck population. In round figures approximately 160,000 blue and snow geese and 750,000 ducks were found during times of peak waterfowl usage during the winter months. In 1961 Louisiana contained seventy-one percent of the Mississippi Flyway's duck population and sixty-one percent during 1962. The coastal refuges were heavily used by not only large numbers of wintering ducks but also by countless tens of thousands of others as temporary resting and feeding grounds. These transients being enroute in the early fall to wintering areas in Mexico, south and central South America, and again in the spring as they were returning north to the breeding grounds in Canada and the north central United States.

Prior to the completion of levees, water control structures and other habitat improvement projects on the refuges it was seldom that more than 150,000 ducks could be found at any time during the winter months. Increased usage came about as a result of habitat manipulation to increase food supplies for waterfowl using facts uncovered by wildlife research on the part of biologists and other personnel employed by the Refuge Division of the Wild Life & Fisheries Commission.

Marsh improvement programs at the Rockefeller Wild Life Refuge have been directed towards the installation of levees and water control structures around thousands of acres of marshland areas previously subjected only to natural tidewater and salinity conditions. As water control was gained, conditions favorable to the production of certain forms of desirable waterfowl food plants were created. On the Rockefeller Wildlife Refuge this was aimed in a direction of producing widgeon grass (Ruppia maritima) in brackish water impoundments having a salinity range of 3000 to 8000 p.p.m. Dewatering procedures were used in the fresh marsh impoundments to produce millet (Echinochloa crusgalli and walteri) and other valuable seed producing annual grasses so highly desired by ducks. The ultimate aim will be to produce stands of three-cornered grass (Scirpus olneyi or robustus) in the brackish marshlands, however, no technique has as yet been devised to accomplish this purpose.

The widgeon grass areas were designed to provide food particularly for the early transient waterfowl in September and October, as well as many of the ducks that stay through the winter months. Millet marshes were created for the purpose of providing food for mallards, pintails, and other puddle ducks that prefer the seeds of these plants. The three-cornered grass is a favorite food of the blue goose in Louisiana and, if stands of this plant can be developed, the carrying capacity of the brackish marshlands will be greatly increased.

Operations on the Marsh Island Wildlife Refuge in the past two years have been centered around the installation of low sill dams or weirs in the tidewater drainage systems throughout the Island. These sills were installed by Refuge personnel at an elevation of six-inches below marsh level in order to partially stabilize water conditions in the marsh and prohibit the relatively complete drainage of ponds on the refuge during periods of low tide in Vermilion Bay. This has been aimed primarily toward increasing the production of widgeon grass in the marsh ponds and three-cornered grass in the surrounding marshlands. These water control structures were constructed from steel sheet piling in the major drainage outlets and four-inch tongue and groove creosote sheet piling in the bayous of twenty feet or less in width. Thousands of acres of marsh areas have been improved using this procedure.

Virtually all species of puddle ducks common to Louisiana used the Marsh Island Wildlife Refuge during the past two years. In addition to the wintering flocks, several hundred pairs of native mottled ducks nested and successfully reared young on the Island. This refuge is of particular importance to blue geese and it contained 90,000 for one brief period during the winter months.

On the State Wildlife Refuge a marsh improvement program has been initiated through the use of the low sill dam method. One major structure has recently been completed and more are planned for construction in the near future. This area also was of particular importance to wintering flocks of blue geese and it was common to find eighteen to 50 thousand of these birds feeding there.

Operations at the Pass-a-Loutre Waterfowl Management Area during the past two years have involved the completion of a boundary line survey by the Louisiana Department of Public Works and the marking of this property line by means of signs. This is the first time that such a survey has been completed and is an important milestone in the proper management of this area.

Public waterfowl hunting is an important phase of the Pass-a-Loutre program and this has been carried out in a very favorable fashion for the past two years. Many duck hunters from throughout Louisiana took advantage of the excellent hunting opportunities there in both the public camps furnished by the Commission, as well as the open hunting areas where sportsmen furnish their own equipment. Duck hunting on this area has been excellent the past two years.

The program at the Coulee Wildlife Refuge has included the maintenance of levees, the marking of the boundary of the property line with refuge signs and the manipulation of water levels to provide the most favorable habitat conditions for mallards and other ducks that frequent the area during the winter months. This area again held sizable mallard concentrations of from fifteen to twenty thousand during the past two winters and this contributed materially in providing season-long duck shooting for the sportsmen residing in that section of the state since the ducks move off the refuge daily. It is one of the key factors in the maintenance of duck hunting through the season since these birds would be driven out of the Monroe area by heavy hunting pressure if such a rest area was not available

One of the primary marsh management practices employed on all the coastal Refuges, excep Pass-a-Loutre, involved the burning of the brackish and salt marshes during the fall and winter This program was carried out in order to temporarily remove the dense wire grass (Spartina patens) cover which tends to suppress the growth of three-cornered grass. Wire grass is a climax plant in the brackish and salt marshes of southwest Louisiana and is far less desirable than is the three-cornered grass.

Blue and snow geese feed heavily in the freshly burned-over marshes and this is another of the primary reasons for carrying out this program.

Trapping operations have been undertaken with nutria being the primary fur bearer sought after by the trappers. The Refuges have been open to trapping and several individuals have taken advantage of this opportunity during the past two winters. Muskrat populations continue to remain low, however, there are signs now that these fur bearers are showing a slight comeback on the Marsh Island Refuge.

The most perplexing problem in the past two years has been the management of mineral operations on the Rockefeller and Marsh Island Refuges in a manner consistent with the wildlife preservation and development program. Some eighteen new leases have been let out on these two areas by the State Mineral Board in recent months and the development of these lands by the lessees has and is presenting problems of considerable magnitude. Although seismograph operations have been relatively simple to handle, the prevention of damage to valuable wildlife marshes is difficult during the period that the mineral lessee begins development. The general approach used by most mineral operators along the Louisiana Coast in reaching drilling sites has been to dredge out a flotation canal some eight feet in depth and sixty to eighty feet in width and barge in the drilling rig and other heavy equipment. Such operations as this not only cause direct losses of many acres of marsh in the excavation of the canals, but also creates water management problems involving drainage of the marshes, increased tidal flow, and some rapid changes in water levels and salinities. This generally tends to reduce the quality of the marsh for wildlife by bringing about changes in vegetative types, particularly in the brackish areas.

The other alternative available to an oil company in reaching a drilling site is to construct a roadway. This method is far less damaging to a marsh area than is the excavation of a canal. For this reason a requirement was written into the new leases issued on the Rockefeller Refuge which specified that the operator would have to construct roadways to drilling sites wherever possible. Although this stipulation was met with considerable resistence, since roadways are more expensive to construct initially, it was nevertheless incorporated in the leases. The successful bidders for the leases were aware that they would have to work under this requiremsnt on the Rockefeller Refuge but in spite of this some of the better leases still brought bonuses in excess of $400.00 per acre.

At this time five leases on the Rockefeller Refuge are being developed by means of roadways and the mineral operator is doing an excellent job. Existing levees were used as roadbeds to a certain extent and materials were excavated from staggered barrow pits for roadbeds when crossing the open marsh areas. This freshly excavated marsh material was then covered by a layer of heavy plastic followed by a board road topped with reef shells. No water management problems have developed and it appears that these roadbeds may eventually serve a very useful purpose since these can be used for water control purposes. Also a bare minimum of marsh acreage is lost using this procedure and it is anticipated that even the barrow pits will produce good stands of widgeon grass. Disturbance to waterfowl by traffic on the roadways has been insignificant since thousands of ducks can be seen feeding up to within a few feet of the roadways.

Although road construction is a problem on the Refuge to the mineral operator it is the only known method at this time whereby all of the leases can be developed without extensively damaging the Rockefeller Refuge for wildlife in the future. Under some of the mineral leases issued in the early fifties roadways were not required. However, it is not anticipated that any new canal networks of any magnitude will be constructed in the near future since these older leases have already been largely developed.

The new leases issued on the Marsh Island Wildlife Refuge will be eventually developed by means of excavating canals to reach drilling sites. Since this area is isolated and can be reached only by boat it was felt that this would be the only practical means of accomplishing this objective. Damages will be minimized as much as possible by requiring the lessees to confine their access as much as possible to existing waterways. When it is necessary to cross a marsh area with a drilling rig it will be specified that the canal will be completely enclosed by means of a levee constructed from material dredged out of the access channel.

No mineral operations have been initiated on the State Wildlife Refuge.

At Pass-a-Loutre some eighty new wells have been drilled on existing leases. These drilling sites have been reached by the operator by means of barges floated in through canals excavated by large draglines. This has posed many marsh management problems, however, it is impossible to build roadways in marshes along the Mississippi River Delta. Encroachment by mineral leases in certain hunting areas has necessitated the moving of some of the public hunting camps. These moving operations were accomplished by Refuge Division personnel.

In spite of the may problems associated with the blending in of the mineral operations with the wildlife program many types of wildlife usage have increased on the Refuges. As noted above this applies particularly to migratory waterfowl since research findings by Refuge Division biologists and other personnel has shown the way for increasing food supplies and improving habitat on less acreage of marsh.

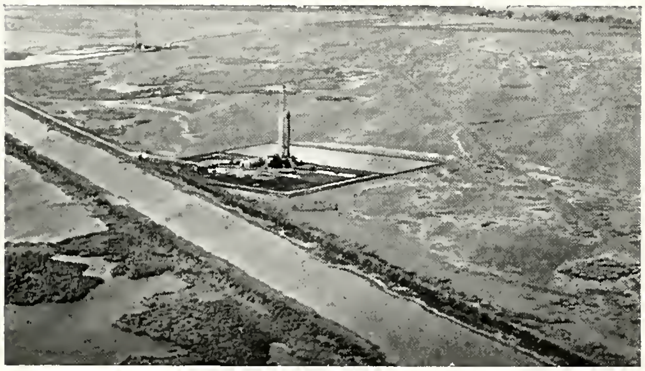
One of the important by-products of the marsh management program at the Marsh Island Wildlife Refuge has been the apparently greatly increased attractiveness of this area as a nursery ground for white shrimp. In the spring and summer millions, perhaps even billions of post-larval shrimp now move into the heart of Marsh Island over the weirs that have been installed by Refuge Division personnel, and use these inland areas as nursery grounds until they have reached a large size. During the fall these shrimp begin to migrate off the island over the weirs and this has created a sport of considerable magnitude around the structures. Sport fishing and cast netting is allowed on the Refuge and hundreds of people from the New Iberia area now enjoy thousands of hours of outdoor recreation cast netting for shrimp with considerable success around the structures. Since commercial shrimping operations are conducted around the perimeter of Marsh Island, it is believed that the shrimp industry is also benefiting from the work on the Island.

Prior to the installation of these low water dams on Marsh Island cast netting for shrimp was virtually unheard of. The primary change brought about in marsh water conditions and the factor that has apparently precipitated this increased improvement for shrimp is that the interior ponds and channels no longer go dry during periods of low tide in Vermilion Bay.

Other operations of a routine nature on all of the Refuges during the past two years have involved the continuous patrolling of the individual areas against poaching and other illegal activities. The primary problem along this line has been the prevention of alligator hunting. The protection offered on the Refuges has greatly increased the populations of this important form of marsh wildlife and this in turn has attracted poachers seeking the skins, which are valued at approximately $5.00 per linear foot. No instances have occurred involving the shooting of waterfowl or anything of this nature during the past two years.

Another of the primary phases of the work program on the Refuges has been to conduct research studies by trained biologists into the factors relating to the control of vegetative types, and also the investigation of methods of increasing wildlife usage and carrying capacities. This program has been extremely successful and has shown the way in the proper handling of environmental conditions in the management of habitat for the benefit of wildlife. Findings on the Refuges have been publicized in papers presented at the Southeastern Association of Game and Fish Commissioners, as well as the North American Wildlife Conference and the Mississippi Flyway Council.

Already the Refuges under management by the Louisiana Wild Life and Fisheries Commission are considered to be among the finest on the continent. The continuation of the present program should insure this status in the future.



Mineral leases on the refuge are now being developed through the use of roads rather than floatation canals.

Rockefeller Wildlife Refuge

NED W. CRAIN
Supervisor
ROBERT CHABRECK
Biologist

LEVEE MAINTENANCE

As a part of the development program on Rockefeller Refuge, 13 impoundments with areas totaling 35,000 acres have been constructed. These units required the construction of some 135 miles of levees.

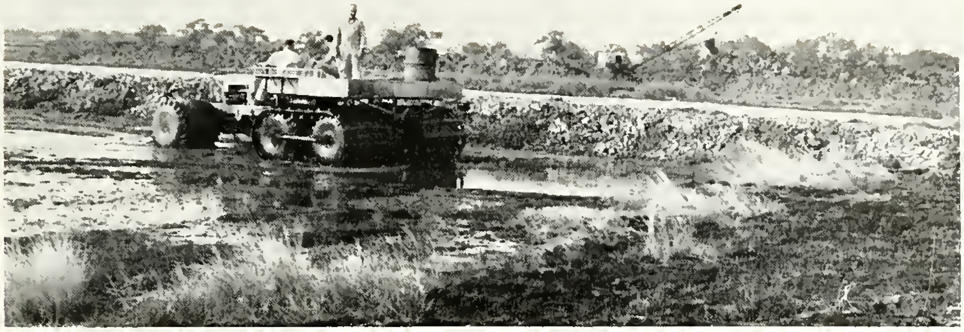
The life expectancy of an impoundment depends on a sound levee system. Levees must be constructed so as to maintain a desired height for the greatest number of years. The soils on Rockefeller Refuge are a semi-fluid material, and this material must not only be used for constructing the levee but also serve as a foundation upon which the levee is placed.

The problems of shrinkage, subsidence and erosion determine the life expectancy of a levee system. Levee shrinkage takes place during the first year, but subsidence and erosion usually continues throughout the life of a levee.

Because of levee subsidence and erosion considerable effort was placed on levee maintenance. Many levees needed raising and reshaping from the original placement. Also, erosion during Hurricane "Audrey" in 1957 and "Carla" in 1961 severely damaged the levee systems.

Goose pasture and main headquarters site, Rockefeller Refuge.

Ned Crain, Refuge Supervisor, checking newly constructed levee.



Refuge draglines have been employed primarily on levee maintenance since these storms. During the past two years, the levee on Lakes 13 and 14 were raised and reshaped. Also, the levee to the west of Lake 2 and south of Lakes 2 and 3 were repaired. Other levee work included raising and reshaping the levee around the experimental area and along the Property Line Canal south of Lake 14.

ROADS AND BRIDGES

Several roads and bridges were constructed on Rockefeller Refuge to provide better access to refuge facilities. Two roadways were completed by the Louisiana Wild Life and Fisheries Commission which now provide access to the Lake 14 Camp and the East End Locks. The roads were constructed by contract through the Department of Public Works. Two bridges were constructed by refuge personnel.

Several new mineral leases were let out on Rockefeller Refuge during the spring, 1963. The terms of the lease require that the oil company use roads to develop the leases wherever possible. In the past leases were developed through canal systems, but experience over the years proved that continuous erosion and land losses resulting from this practice caused serious problems to management. Road systems are now employed to develop leases and all future leases will include road systems.

Water control structures have been found to provide more desirable waterfowl feeding areas. Dyson-Bayou Rockefeller Refuge.

LAKE NO. 6

The marshes drained by Little Constance and Big Constance Bayous were subject to heavy flooding during heavy rains, while during drought periods, high saline tides inundated these marshes. The constant changing from fresh to salt water prevented desirable vegetation for wildlife from becoming established.

In 1961, a six-mile levee was placed along the southern edge of this watershed and extended from Deep Lake to the Property Line levee south of Lake 13. Three large drainage systems intersected the levee and structures were placed in each of these. On Little Constance and Big Constance concrete gated structures were installed to provide drainage and boat passage and a bulkhead was placed across Dyson Bayou.

The structures were completed in August, 1962, thus bringing about control of salt water intrusion problems over 13,500 acres of prime waterfowl marshes.

This project is now 80 per cent complete and a concrete gated structure in North Island near the north boundary of the refuge will stabilize water levels in the area and provide suitable control for managing the area for wildlife.

GOOSE PASTURES

A project to establish a resident colony of Canada geese on Rockefeller Refuge required the construction of several goose pastures. Suitable areas were fenced and de-watered to provide feeding and nesting areas for the birds.

Fencing of the Experimental Area was completed in February, 1963, and 100 captive geese were released on the area. The Experimental Area included 160 acres which were kept dry with a 16 inch lift pump.

In June, 1963, plans were formulated to obtain a large number of adult geese from the Swan Lake Refuge in Missouri as breeders. In November, 1700 Canada geese were transported, wing-clipped and released on the area by refuge personnel. After plans and specifications were prepared by the Department of Public Works for the construction of a suitable fence around Lake No. 2, bids were received for the work and a contract awarded to the low bidder. This area is large enough to accommodate the birds during the period they are to be held on the refuge. This is a part of an all out effort being made to rebuild this important game bird population in Louisiana. Two areas in Lake No. 2 were diked off and de-watered to provide feeding and nesting areas.

WAREHOUSE AND BULKHEAD

Plans and specifications were prepared by the Department of Public Works for a warehouse and bulkhead at the refuge headquarters. Bids were solicited by that agency and in July, 1963, a contract was awarded to the low bidder.

The facilities were constructed adjacent to the present facilities at the headquarters and serve primarily for equipment and materials storage. Because of saline conditions, equipment deteriorates rapidly when left outdoors.

The bulkhead is 345 feet long and provides docking and loading space from which the refuge is serviced. Also, the bulkhead restricts bank erosion to protect other installations of the Commission at this site.

WATER CONTROL STRUCTURE

Weirs were constructed on Pidgeon Bayou and East Little Constance Bayou in the spring, 1964. The bayous are 60 feet wide and each have a watershed of approximately 3000 acres. Timber piling 30 feet long and inter-locking steel sheet piling were used for construction. All work on the structures were done by refuge personnel using refuge equipment.

The crest of each weir was set at an elevation 6 inches below marsh level. The weirs stabilize water levels and reduce water salinities, turbidities and tidal action, thus greatly improving the enclosed areas for wildlife.

The completion of these structures brought all natural drainage systems on Rockefeller Refuge under some type of water control.

BANK EROSION AND ABATEMENT

The first canal to be excavated on the Rockefeller Wildlife Refuge was in 1944 and was dug by Humble Oil Company to an oil well site. This drilling venture resulted in a dry hole and further drilling was not undertaken until 1948 when five large tracts on the refuge were leased for the purpose of oil exploration. The canal servicing the first well was abandoned and levees deteriorated to the point where high salt tides could penetrate into marshes adjacent to this canal. With the accelerated oil activity on the refuge, salt water intrusion became an ever increasing problem and it was with this problem facing the Commission that the decision was made to construct a series of impoundments on the refuge. A complete geological study was made of the refuge and findings from this study were used in determining the placement of many of the impoundment levees.

It has been found from detailed studies that the greatest problem with an impoundment levee is the use by boats in the canal from which spoil is excavated. Boat traffic causes a wave wash on the berm of the canal and with heavy usage the berms will be eroded to a point where wave action will attack the base of the levee. In the Superior Oil Company's Deep Lake and Constance Bayou fields and the Union Producing Company's Deep Lake field it has been found that the several canals have increased in width from an original 65 feet to 175 feet at one station and the minimum increase has been to 139 feet. This represents an increase in size of 269 per cent and 214 per cent respectively. Cross sections taken in September 1963 by Nichols indicates that this canal system is continuing to increase at the rate of about 2 inches per month due to erosion. There is a direct correlation between the rate of erosion and the amount of boat traffic in a canal system. Estimates by engineers of the Louisiana Department of Public Works for the stabilization of these canals through bulkheading has been about $125 per linear foot of levee. With the realization of this high cost of maintenance of levees along canals used by boats, the Louisiana Wildlife and Fisheries Commission recently adopted a resolution requiring that additional oil development work on the Rockefeller Refuge be through the construction of road systems rather than canals.

MIDDLE BAYOU STRUCTURE

The construction of a concrete-gated structure on Rollover Bayou in 1956 marked the completion of the first stage of a project designed to bring water level and salinity control to the east end of Rockefeller Refuge. Hurricane "Audrey" struck soon afterwards and the job of rebuilding damaged facilities on the refuge caused considerable delay in this project.

In 1962, plans and specifications were prepared on a similar structure in Middle Bayou as a second phase of this project. A contract was awarded to the low bidder, F. Miller and Sons of Lake Charles. Work was begun on the structure in 1962 and completed in June, 1963.

The structure is equipped with three separate radial lift gates which can be raised to permit drainage or boat passage. When lowered the gates block the stream and prevent salt water from entering.

The structure placed 9,000 acres of marshland under management and during the past winter waterfowl usage of this area has been greatly increased.

STOP-LOG STRUCTURES

Culverts placed in the levees of 10 impoundments in 1955 have begun to deteriorate and must be replaced. A pilot project was constructed in a small impoundment to determine the effectiveness of stop-log structures for flooding and draining the impoundments. Such structures have a longer life expectancy and will provide greater control to water levels and salinities in the areas.

If the stop-log structures prove superior to gated culverts, this project will be expanded to include all impoundments on Rockefeller Refuge.

CAMP REPAIRS

The East and West End Camps on Rockefeller Refuge were rebuilt in 1958 after being severely damaged by Hurricane "Audrey" in 1957. In 1962 additional maintenance was required and both buildings were painted. Sub-floor insulation was installed at West End and two porches were closed in to provide additional space in the building.

In September, 1963, one-half of the East End Camp was modified to make an apartment. Also, the flooring in the camp was sanded and refinished. A small building was constructed at East End for storage and a car garage.

SPORTS FISHING PERMITS

The Rockefeller Wildlife Refuge was opened to visitors for sports fishing, photography and sight seeing. All persons entering the refuge were required to have a permit in their possession. This was in keeping with the deed of donation under which the refuge was received by the State from the Rockefeller Foundation. These permits are issued free to all persons upon request.

During 1962, 6,456 permits were issued to persons wishing to visit the refuge. During 1963, this number increased to 7,014. Booklets on the refuge program and maps of the area were distributed upon request.

It was necessary to confine the visiting season on the refuge from March 1 to October 1. The deed of donation stipulates that visiting be restricted during this period in order that the ducks and geese may rest and feed without disturbance during the fall and winter. This area is one of the major waterfowl wintering areas in the Mississippi Flyway. The refuge winters between 150,000 and 400,000 ducks, 50,000 to 70,000 geese and a large number of coots and rails. This represents eleven species of ducks and three species of geese. The area also acts as temporary resting area in the spring and fall for countless tens of thousands of transient ducks and migratory song birds that winter in Mexico and points further south.

ROCKEFELLER WATERFOWL INVENTORY

Date	*9-19-62*	*10-16-62*	*11-5-62*	*12-5-62*	*1-8-63*	*2-14-63*	*9-4-63*	*9-18-63*	*10-8-63*	*10-26-63*	*11-7-63*	*11-21-63*
Mallard	......	300	15,000	20,000	20,000	4,000	.....	.....	70	80	5,912	21,800
Gadwall	......	3,000	10,000	25,000	35,000	27,000	.....	.....	......	260	53,450	44,900
Baldpate	2,000	30,000	35,000	35,000	40,000	25,000	.....	915	43,525	90,915	72,000	29,275
G. W. Teal	......	4,000	20,000	30,000	35,000	25,700	25	700	12,075	3,450	60,000	56,400
B. W. Teal	100,000	75,000	30,000	30,000	35,000	15,900	12,600	75,300	111,180	75,975	48,600	25,600
Shoveler	2,000	40,000	30,000	30,000	30,000	17,300	50	2,760	11,400	10,200	10,490	13,200
Pintail	15,000	30,000	100,000	100,000	125,000	21,700	70	5,000	60,730	52.166	62,250	75,700
Black & Mottled	5,000	5,000	5,000	5,000	5,000	5,000	1,840	3,950	5,800	1,450	1,675	1,850
Scaup	......	......	300	800	800	2,000	.....	.....	......	......	......	1,260
Ruddy	......	......	200	200	200	200	.....	.....	......	......	......	......
Mergansers	......	......	1,000	1,000	2,000	3,000	.....	.....	......	......	30	500
TOTAL DUCKS	124,000	187,300	246,500	276,500	328,000	146,800	14,585	88,625	244,780	234,496	314,407	270,485
Blue and Snow Geese	......	......	1,000	5,000	8,000	28,000	.....	.....	......	......	11,800	15,000
Canada	......	......	50	50	50	50	.....	.....	......	......	......	......
TOTAL GEESE	......	......	1,050	5,050	8,050	28,050	.....	.....	......	......	11,800	15,000
Coots	......	3,000	20,000	20,000	20,000	20,000	.....	.....	50	200	10,600	13,500

Marsh Island Wildlife Refuge

HARVEY H. LOURD
Supervisor
TED JOANEN
Biologist

WATER CONTROL STRUCTURES

One of the most important management programs on Marsh Island has been the construction of wake field type weirs. These structures have reduced turbidity, water level fluctuation, and reduced the rate of tidal exchange and salt water intrusion. This in turn encourages desirable waterfowl food plants in the marsh and aquatic vegetation in the ponds and lakes. The construction of weirs have proven to be very successful in the Louisiana marsh in areas which will not support a continuous levee.

Plugging the drainage systems with earthen dams have been used to accomplish somewhat similar effects, but these earthen dams require constant maintenance and also cause excessive flooding and drowning out of marsh vegetation.

In 1960-61 ten of these weirs were built on Marsh Island. These ten weirs control approximately 7,500 to 8,000 acres of marshland water levels.

In January, 1963, a large weir was built in the east branch of Bird Island Bayou. This weir was constructed of creosote timber and sheet piling and was treated with rust preventive coating. The bayou at this point is about 90 feet wide with fairly unstable banks, but an alternate location was unavailable. In order to prevent erosion, oyster shells were placed on the ends of the weir and in the bayou adjacent to the weir. The marsh affected by the weir includes some 2,100 acres.

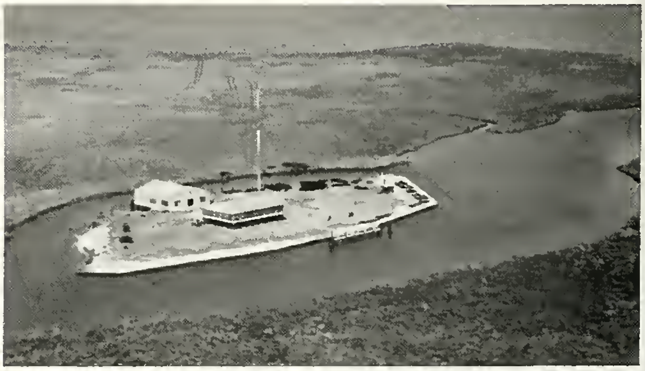
Numerous water control structures have been installed on the Marsh Island Wildlife Refuge by personnel and equipment under the supervision of Harvey Lourd, Refuge Supervisor.

On the east side of Marsh Island it was necessary to build a sheet piling dam in Dynamite Cut. This consisted of two rows of steel sheet piling across the cut with the area in between filled with oyster shells. This has completely stopped the flow of water through the cut.

BOAT MAINTENANCE

Because of the shallow water and numerous oyster reefs, boat maintenance is a continuous problem. It has been necessary to replace wheels, struts, and rudders often. All minor repairs were accomplished on the refuge, and all major repairs were sent to the wharf in New Orleans. During this biennial period, the inboards were hauled out annually, scraped and completely repainted.

These water control structures are placed in strategic drainages to control water levels, tidal action and water salinities on Marsh Island Refuge.



The main camp of the Marsh Island Wildlife Refuge is located on Bird Island Bayou. The completion of the 750 bulkhead has eliminated all erosion in front of the headquarters.

HEADQUARTERS

The main camp which is located on Bird Island Bayou required considerable maintenance. During the past two years the entire camp was repainted, and much of the wood work and screens were replaced. The yard around the headquarters site was planted to St. Augustine grass and lime was applied to reduce the acid condition of the soil.

The 750 foot bulkhead in front of the camp was backfilled with oyster shells and graded down to match the elevation of the remainder of the headquarters site. This structure has stopped all erosion in front of the headquarters on Bird Island Bayou.

WOOD DUCK PEN

Plans have been discussed to construct a wood duck pen on the refuge headquarters site. This pen will house twenty (20) breeding pairs of wood ducks, and the young will be released annually on the refuge. All the material necessary for construction has been purchased and its completion is expected in December, 1963.

The birds will be obtained from the captive flock on Rockefeller Refuge. These efforts are directed towards the establishment of a resident flock of wood duck on Marsh Island Refuge. However, this work is still in the experimental stages.

MARSH BURNING

A controlled burning program is conducted on Marsh Island and State Wildlife each year. This program begins in the fall and extends until the last of February. These burns are intended to remove dense stands of vegetation and set back plant succession, therefore encouraging the growth of better game food plants.

MARSH ISLAND WATERFOWL INVENTORY

Date	*9-19-62*	*10-16-62*	*11-5-62*	*12-5-62*	*1-8-63*	*2-14-63*
Mallard	.....	300	1,500	5,000	10,000	10,000
Gadwall	.....	2,000	10,000	10,000	15,000	15,000
Baldpate	500	5,000	10,000	10,000	12,000	10,000
G. W. Teal	.....	500	2,000	1,000	5,000	5,000
B. W. Teal	8,000	4,000	10,000	8,000	6,000	6,000
Shoveler	500	2,000	18,000	8,000	4,000	4,000
Pintail	2,000	3,500	15,000	8,000	4,000	4,000
Black & Mottled	5,000	5,000	2,000	2,000	2,000	2,000
Scaup	.....	200	200	300	2,000	5,000
Mergansers	.....	100	200	200	400	200
TOTAL DUCKS	16,000	22,600	68,900	52,500	60,400	61,200
Blue & Snow Geese	.....	.....	1,000	15,000	18,000	22,000
Coots	.....	8,000	15,000	20,000	20,000	15,000

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*All duck and coot censuses conducted from aircraft by Raymond Palermo, Biologist, Louisiana Wild Life and Fisheries Commission.

Goose inventories made from the air by John Lynch, Biologist, U. S. Fish and Wildlife Service. of the total of geese: 5% were Snow Geese, 95% were Blue Geese.

Migratory waterfowl by the thousands winter on Marsh Island.

Pass-A-Loutre Waterfowl Management Area

ELLIS W. LOGA
Supervisor

The Pass-a-Loutre Waterfowl Management Area is a 66,000 acre tract of marsh land that was set aside by act of the legislature in 1921 as a public waterfowl hunting area and has provided excellent duck shooting since that time. The area is located at the extreme end of the Mississippi Flyway at the mouth of the Mississippi River in Plaquemines Parish. Because of its strategic geographical location it is maintained through the annual deposition of extremely fertile silt that is deposited on the Pass banks, marsh areas and ponds. Each spring during the high river stages as the Mississippi River reaches flood stage on the lower delta, it flows over its banks carrying tons of top soil from the central U. S. This material is dropped out as the water slows down and creates ideal conditions for the production of choice waterfowl food plants in the marshes.

In 1954 the Louisiana Wild Life and Fisheries Commission initiated a public waterfowl hunting program on the Pass-a-Loutre area and nine hunting camps were constructed to provide overnight facilities. These camps were strategically located through the central portion of the area and occupied some 20,000 acres of ideal hunting grounds. The use of these camps is restricted to duck hunters who make application to the commission and are selected by drawings. A fee of $5.00 for a two day hunt is charged each hunter. In exchange for this nominal cost the Louisiana Wild Life and Fisheries Commission provides transportation from Venice, Louisiana to Pass-a-Loutre and return. At Pass-a-Loutre a camp, cooking utensils, beds, decoys, duck boats, butane and a two-day hunt on one of the finest duck hunting marshes is provided. In addition to the portion of Pass-a-Loutre reserved for the public camps the remainder of the area is opened to hunters who wish to make a hunt using their personal equipment and facilities. Free permits are issued for the use of this area and are valid for the entire waterfowl season. Duck hunting on this portion of the area is equally as good as the area reserved for the camps and use of this area has increased tremendously during the past three seasons. A portion of this open area lying west of South Pass has been opened for afternoon shooting to take advantage of the blue and snow geese which utilize this portion of Pass-a-Loutre. On the remainder of Pass-a-Loutre morning shooting only is permitted in order to hold the large body of ducks which utilize this area and provide choice waterfowl shooting throughout the season. During the 25 day duck season of 1962-63 a total of 327 permits were issued for use of our camps. Of this total 273 hunters made the trip and killed a total of 1,013 ducks for an average of 1.85 per hunter's effort. During the more realistic season of 1963-64 a total of 591 permits were issued with 526 making the trip and killing a total of 3,681 ducks for an average of 3.49 per hunter's effort. The number of hunters, fee charged, and the money derived from the present shooting program since its initiation in 1954 are shown in Table 1.

Intensive data on the kill of waterfowl at Pass-a-Loutre is recorded by biologists of the Refuge Division.

Table No. 1

Waterfowl Season	*Number of Permits*	*Fee*	*Money Derived*
1954-55	576	$ 2.00	$1,152.00
1955-56	1,523	2.00	3,046.00
1956-57	660	10.00	6,600.00
1957-58	569	10.00	5,690.00
1958-59	1,143	5.00	5,715.00
1959-60	648	5.00	3,240.00
1960-61	618	5.00	3,090.00
1961-62	326	5.00	1,630.00
1962-63	327	5.00	1,635.00
1963-64	591	5.00	2,955.00

DEVELOPMENT

Management of the Pass-a-Loutre area is relatively simple as compared to other marsh areas under management by the Refuge Division because of the annual deposition of silt as mentioned above. It is from the high river stages that the entire delta complex is maintained. In many portions of Pass-a-Loutre as much as 4″ of fertile silt are deposited annually. Extensive stands of delta duck potatoe are produced as a result of this deposition and the normal manipulation of water levels. Several small earthen plugs and levees have been constructed on the area to favor the establishment of stands of desirable food plants by use of the refuge dragline.

The Department of Public Works completed a boundary survey of the area in the spring of 1962. Upon completion of this survey appropriate metal signs were placed around the entire boundary to provide the Commission with more rigid control of the hunting activities and insure hunters who pay for a two-day trip of not having to compete with unauthorized persons for hunting space.

The development of the various mineral leases on Pass-a-Loutre has continued to be a problem of growing magnitude and one which required continuous vigilance by refuge personnel to assure that these activities do not cause undue damage to the area. All of the drilling sites on the area must be reached through excavation of access canals. Being a floating marsh area levees will not stand up and thus the problem of drainage and salt water intrusion is created at each new drilling site. For the most part the recent oil activities have been restricted to a portion of Pass-a-Loutre where oil fields have been established for many years and has caused only minor damage to the area.

MAINTENANCE

Continuous maintenance work has been necessary on facilities at the main headquarters site in order to keep these buildings and wharves in good condition. A large gasoline storage dock was completed and is located well away from the other facilities to insure safety. The yard site at the main headquarters building has been cultivated and a good cover of grass established over the fill that was placed in the yard in 1962. Several varieties of trees were placed in the yard to enhance the headquarters site. The air strip serving the facilities has been maintained in good condition and has been used extensively by Commission airplanes on patrol, maintenance and development work for the entire lower delta area.

A ground wire was installed on the existing power line. Electricity is provided to the main headquarters site through a power line connected to the Freeport Sulphur Company installation. The original installation had caused numerous breakdowns in the Freeport plant and due to the fact that they are generous enough to provide us with free electric power every effort was made to correct this situation. Cross arms were installed and a lightening arrestor and ground wire placed on the entire system. Since this installation we have not had any problems associated with this line. Two large metal cisterns were installed at the main headquarters site to provide fresh water at these facilities. This camp is dependent upon rain fall for its water supply for cooking and drinking purposes.

The public waterfowl shooting program on Pass-a-Loutre provides choice shooting for hunters from all parts of Louisiana.

All of the public hunting camps are in excellent condition and are given a fresh coat of paint and thoroughly cleaned prior to the commencement of each hunting season. Three of the public camps have been moved to more desirable sites during the past two years to insure better hunting for persons using these facilities. New yard sites were constructed for two of the public camps and they were moved back away from the passes. Small wharves have been completed in each of the nine camps and are very beneficial in transferring hunters and their equipment. Decoys, push poles, paddles, life preservers and various utensils and supplies for the camp are maintained in good condition and stored in a warehouse at the conclusion of each waterfowl season. Hunters using the public camps at Pass-a-Loutre have been very complimentary as to their comfort and condition.

The patrol boats "Sprig" and "Skimmer" have been sent to the Commission's wharf in New Orleans on various occasions for repairs. Numerous outboard, tractor and dragline repairs have been made by refuge personnel.

The restrictions of cattle grazing on the Pass Banks of Pass-a-Loutre have proven to be very helpful in restoring vegetation which catches and retains silt during the spring and summer floods. At present cattle are permitted on two limited areas of Pass-a-Loutre where the vegetation is dense enough to permit grazing without damage.

A Louisiana sportsman catching shrimp from behind one of the newly constructed weirs on State Wildlife Refuge.

RESEARCH

Biologists of the Commission have collected intensive waterfowl kill data for the past ten seasons at the public camps on Pass-a-Loutre. This information has been used by the Commission in many of their arguments to secure a more realistic waterfowl season for Louisiana duck hunters. A definite increase in hunter's interest was indicated during the 1963-64 season. The total kill of waterfowl by hunters participating in the public camps for the 1962-63 and 1963-64 seasons are presented in Table No. 2. The information for the past two seasons gives an average kill per hunter's effort of 1.85 during the 1962-63 season which was 25 days in length and had a bag limit of only two ducks per day. During the more liberal 1963-64 season an average of 3.49 ducks per hunter's effort were bagged.

An intensive research program was begun at Pass-a-Loutre to study the production, utilization and value of delta duck potatoe. Preliminary reports from this investigation indicate a very high utilization of these plants by nutria, duck, geese and wild hogs at Pass-a-Loutre.

Table No. 2

Species	*1962-63 25 days 2 duck bag*	*1963-64 35 days 4 duck bag*
Pintail	356	435
Baldpate	198	613
Gadwall	168	1,366
Blue-winged Teal	113	198
Shoveller	61	216
Mallard	43	128
Green-winged Teal	34	56
Mottled Duck	27	45
Lesser Scaup	6	562
Ring-Necked Duck	4	60
Merganser	1	2
Wood Duck	1	0
Black Duck	1	0
TOTAL DUCKS	1,013	3,681
Blue Geese	0	13
Snow Geese	0	7
Canada Geese	CLOSED SEASON	
TOTAL GEESE	0	20
Coots	101	228

State Wildlife Refuge

HAMPTON GREEN
Supervisor
TED JOANEN
Biologist

WATER CONTROL STRUCTURES

Several preliminary checks were made of natural drainage systems on State Wildlife Refuge in order to locate sites for the construction of water control structures. Plans were formulated for the construction of weirs in the systems to affect water conditions and improve the area for wildlife. In October, 1963, work was completed on a 60 foot steel sheet piling weir on North Bayou near the refuge headquarters. It was necessary to construct 15 foot wings on each side of the weir and deposit oyster shells at both ends to prevent erosion. This weir stabilizes water levels and water salinities, reduces water turbidity and improves marsh conditions on an area of approximately 1,500 acres.

All work on this project was performed by refuge personnel. A refuge dragline and other equipment were used during construction.

HEADQUARTERS AREA

The main camp at State Wildlife Refuge has undergone considerable remodeling and repairs in the past two years. The exterior of the main camp was cleaned and repainted and all deteriorated wood and screens were replaced. Also a concrete footing was poured under the pillars of the main camp. The old footings had decayed and weakened the entire foundation.

Boundary markers and new posted signs were

Routine patrols are made year round by refuge manager Hampton Greene and refuge personnel.

Headquarters camp of State Wildlife Refuge.

made and installed at Hell Hole and Cut-Off Bayous. All grass and debris was away from the refuge signs to remove the danger of destroying the signs with accidental fire and storm tides.

BOAT MAINTENANCE

All boats and motors are maintained by refuge personnel with the exception of major engine and hull repairs. Routine maintenance was done on all equipment as required. The engine was replaced in the Lafitte boat. Also, wheels, shaft and struts were changed as needed. The engine was removed from the "Ostrea" and taken to the wharf for overhauling.

AIRSTRIP

In April a dragline was brought to the refuge to lengthen the airstrip. The completed job brought the total length of the strip to 1,500 feet.

Formerly, guide-lines supporting the refuge radio tower blocked the east end of the airstrip. In May the tower was moved to another location, thus removing this hazard.

Grass over on the strip was in poor condition, so soil analysis were made and revealed that the airstrip was highly acid. In June, 10 tons of lime was applied to the strip with hopes of correcting this condition and creating a heavier sod.

BOATHOUSE AND WORKSHOP

The workshop, tractor shed and tractor on State Wildlife Refuge were destroyed by fire in March, 1963. All refuge property was insured and full compensation was received for the losses.

A new tractor was purchased and a shop constructed to replace the one destroyed.

Plans were made to construct a boathouse at the headquarters. Material was ordered and work will begin during the year.

Coulee Wildlife Refuge

The Coulee Wildlife Refuge is comprised of some 3,000 acres of hardwood bottom land located in the southern portion of Morehouse Parish. This refuge has long been recognized as a key factor in the successful waterfowl shooting on Wham Brake which is only a short distance from Coulee. During the past two winters this area has continued to provide a resting site for some 35,000 ducks. These birds spend the days resting on Coulee and move out to Wham Brake late in the afternoon and night to feed. These birds provide fine waterfowl shooting on Wham during the early morning and after the shooting pressure increases the birds return to Coulee to rest.

During the summer of 1963 an application was made by three of the property owners to withdraw a total of some 300 acres of property from the refuge. These lands were located along the extremities of the refuge and in no way jeopardized the purpose for which this area is being maintained, therefore, the Louisiana Wild Life and Fisheries Commission approved the withdrawal of these lands. Individuals who have made their lands available for this purpose should be commended for their fine contributions to the perpetuation of the sport of waterfowl hunting in north Louisiana.

DEVELOPMENT AND MAINTENANCE

During the past two seasons the boundary line around the entire area has been maintained by the use of a refuge bulldozer and disc to preclude any possibility of hunters straying onto the ref-

Appropriate boundary and Refuge signs were installed on the Coulee Wildlife Refuge in Morehouse Parish.

uge accidently. A white line and appropriate refuge boundary signs are prominently displayed on the boundary and two large attractive refuge signs have been placed along the southern boundary of the refuge adjacent to the highway.

A large water control structure was placed in the lower basin to provide adequate drainage for manipulating the water levels. This structure is a 30″ corrugated metal culvert with an Armco lift gate and spillover funnel attached. The structure is approximately 150 ft. in length and was installed by refuge personnel and equipment. A refuge bulldozer was employed to construct a series of drainage ditches and boundary trails in the lower basin to provide Commission employees the access into the area for the purpose of management and duck banding work.

Numerous leaks in the levee system on the two basins at Coulee have been repaired by use of the refuge bulldozer. These leaks are anticipated in the levee system from time to time due to the presence of decaying trees which were covered in the original construction of the impoundment levees.

Frequent patrol trips have been made by agents of the Enforcement Division to guard against trespassing and other violations.

RESEARCH

A total of 20 live alligators have been transplanted to the Coulee Refuge and upon numerous occasions these alligators have been observed in the upper basin which is maintained as a permanent flooded area. So far no evidence has been found of alligator nesting in the basin; however, several of the animals are of adequate size for reproduction and an abundant food supply for these valuable animals is readily available on the area. A very intensive study of this program is being made by biologists of the Refuge Division in order to gain all information possible pertinent to the re-establishment of this valuable natural resource in the northern part of the state.

During the past two years an abundant supply of waterfowl food plants have been produced in the two basins of Coulee Refuge. However, as pointed out before the refuge is primarily a resting area and only a small amount of waterfowl food plants is necessary to maintain this as one of the finest waterfowl refuge area in Louisiana. An extremely heavy growth of American lotus is beginning to invade the upper basin and will undoubtedly cause a reduction in production of desirable aquatics if it is allowed to go uncontrolled. A system of strip selective poisoning of these plants is planned in an effort to control its growth. The dense growth of young willow in the lower basin were cleaned up to a large extent with the use of the bulldozer. In areas where the willow were growing in soft semi-aquatic conditions, granulated 2-4D will be applied during the spring of 1964 to further control and eliminate the intrusion of this plant into the lower basin.

A Refuge Division bulldozer was used to maintain a well-defined boundary line around the Coulee Wildlife Refuge.

St. Tammany Wildlife Refuge

JOSEPH M. DIRMANN
Supervisor

During the past two years St. Tammany Wildlife Refuge has continued to suffer severe erosion problems along the south shoreline where it joins Lake Pontchartrain. It is anticipated that with the general rate of erosion that this small waterfowl refuge will eventually be eroded away by the encroachment of Lake Pontchartrain. However, a large number of waterfowl use the pond areas adjacent to the beach and provide a small nucleus of ducks for waterfowl hunters using marshes in the area. The boundary line has been maintained by refuge personnel.

A small number of muskrat have continued to reproduce in this area and due to the small size of the refuge an overflow of muskrat has continued to provide trapping of these animals on the adjacent marsh lands.

Refuge Division Research

ROBERT H. CHABRECK
Research Leader

The research program of the Refuge Division was staffed by technical personnel under a research section. The primary goals of the research section were to investigate and evaluate various management practices for benefitting both the marsh and marsh wildlife. The results of various management practices not only improved conditions on the refuges, but also serve as a guide for other land owners interested in marsh management.

Progress reports of research findings are kept on file with the Louisiana Wild Life and Fisheries Commission. Final reports are published in journals or circulars with international distributions.

Studies in progress on animals and animal populations and the effects of water levels and salinities on various plants and plant growth will be continued. The status of various studies now in effect and a brief listing of the study purposes and results follow under separate headings.

IMPOUNDMENT SURVEY

The primary objective of this study was to determine the ecological changes in vegetation in the ten Rockefeller Refuge impoundments and to relate these changes to annual climatic and edaphic factors.

Refuge Biologists Robert H. Chabreck (left) and Ted Joanen measuring growth of plants on Rockefeller Refuge.

Both 1962 and 1963 arrived with all impoundments having an abundance of water. However, with the absence of rainfall the water levels dropped and by May practically all were dry. Lakes Number 8, 13 and 14 were drained in March for the purpose of producing annual grasses.

MONTHLY RAINFALL ON
ROCKEFELLER REFUGE
1962

Month	*Rainfall (inches)*
January	3.09
February	.79
March	.82
April	2.60
May	.44
June	6.74
July	2.30
August	6.49
September	2.79
October	1.67
November	3.50
December	3.67
TOTAL	34.90

As a result of the low rainfall most impoundments remained dry throughout the fall. Lake 8 was one exception and pumping units were set up and water pumped into the area.

In the control areas water levels fluctuated drastically, varing with tide levels.

Water salinities varied throughout the year, increasing as water levels dropped from evaporation. During August and September, salinities were very high as a result of evaporation.

The absence of adequate rainfall practically eliminated wigeongrass. As a result the vegetative coverage in certain impoundments was lower in 1962 as compared to previous years. However, in certain other areas such as Lake 8 the per cent coverage increased as a result of drying, permitting annual grasses to grow.

During August, 1962 and 1963, the vegetation in each impoundment and adjacent control areas was sampled using line transects. Also, monthly checks were made of water levels and salinities in all impoundments and control areas during both years. Data on rainfall was gathered with a rain gauge at the Main Headquarters Area on the refuge.

The year 1962 was extremely dry with rainfall some 25 inches or 42 per cent below normal each year. The total rainfall in 1962 (see table) was 34.9 inches, 21.8 inches below the total for 1961. Even though dry, conditions were ideal for the growth of annual grasses. The early spring drought removed surface water and permitted germination. Heaviest rains fell during June, July and August supplying the needed moisture to the young seedlings. The fall drought following produced a bumper crop of fall panicum (*Panicum dichotomiflorum*). In the fall, 1963, the marshes were extremely dry but Hurricane "Cindy" in September, 1963, brought over 5 inches of rain and enough water to hold early migrant ducks along the Louisiana coast.

Wire grass continued to dominate the impoundments and control areas during 1962 and 1963. However, in the control areas this species was almost three times more abundant.

Waterfowl food plants made up the majority of the composition of the impoundments, but in the control areas these species ranked very low.

Lake 3 has produced bumper crops of wigeongrass in former years but during 1962 none was produced as a result of the drought.

For several years Lake 8 supported vast stands of California bullrush, but this species gradually disappeared and the lake became a large body of open water. The lake had formerly been maintained as a permanently flooded freshwater impoundment, but with the disappearance of the vegetation it was drained in the Spring, 1962, in order to revegetate the open areas.

BIRD BANDING

Much time was devoted to bird banding during 1963. Banding efforts were directed mainly at ducks, but a small number of coots, clapper rails and blue geese were also banded.

Ducks banded during 1963 on Rockefeller Refuge included 1,268 lesser scaup, 86 blue-winged teal and 19 green-winged teal. The ducks were captured on Lakes No. 9 and 10 using baited wire box traps and were captured during February and March.

A Refuge Division biologist was the Louisiana representative on the Cooperative Duck Banding Project in Canada during the summer, 1963. The biologist worked on a three-man crew in Brooks, Alberta on a bait banding assignment. The crew banded 2,160 ducks during the four weeks of work in that area. The banding project is conducted annually and numerous crews, made up of personnel from various state wildlife departments and federal service, work throughout Canada. The information from banding is used to trace the duck's routes and determine mortality rates.

WEIR STUDY

Weirs have been constructed in many marsh areas along the Louisiana coast for the purpose of marsh management. The weirs are constructed in the drainage systems of selected marsh areas and offers the only suitable method of gaining control of water conditions in unstable marsh which will not support continuous levees.

Studies on weirs under various marsh conditions on Marsh Island Refuge and in Terrebonne and Lafourche Parishes have shown that the greatest production of aquatic vegetation through this type of management is achieved in marshes varying from brackish to saline. In fresh to brackish marshes with drastic salinity changes, the occurrence of aquatic vegetation was generally higher in ponds behind weirs than in adjacent control areas, but with frequent exceptions.

Weirs are constructed for the primary purpose of influencing vegetative growth in wetlands affected by the structures by altering salinity, turbidity, water levels and reducing tidal action.

The changes in salinities amounted to less than 10 per cent difference behind weirs as compared to the control areas. Although the weirs were constructed with idea of controlling salinities, they did not achieve this objective during the study.

Weirs have their greatest effect on salinities during long droughts, when highly saline water is normally permitted to enter interior marshes. At such times brackish plants are severely affected.

Water turibidity on Marsh Island Refuge differed less than 10 per cent between ponds affected by weirs and in control ponds. Thus, the original objective of altering turbidity was not effectively accomplished. Because of high salinities in the Terrebonne-Lafourche Area, turbid water was practically non-existent.

The greatest effect through weirs was gained in water level stabilization. The main difference occurring between water levels affected by weirs and those not affected was 0.44 feet. The greatest difference in water levels at one time was 2.7 feet. Areas not affected by weirs had uncontrolled tidal action, whereas the weirs reduced the flow of water and insured a minimum water level in ponds affected.

During the study no difference was found in marsh vegetation behind weirs and in control areas. However, the occurrence of aquatic vegetation was much higher behind weirs in areas not having a drastic salinity fluctuation.

THREE-CORNERED GRASS STUDY

This study was begun in July, 1962, with Patrick A. Doland as study leader. The objectives of the study were:

1. Originate a guide for the average land owner to follow concerning time of collection of seed.
2. Determine practical and economical methods of collection of seed.
3. Determine optimum physical and chemical condition for seed storage and seed germination.
4. Determine proper time, method and place for sowing seed.
5. Observe the conditions affecting plant growth and reproduction.

During July, 1962, 20 sacks of three-cornered grass seed were collected at Cypremort Point. Several methods were used to remove the seeds from the seed heads including a mechanical seed trasher, hand trashing, hand rubbing over a screen and a hammer mill. The latter method was most effective. Seeds were separated from the chaff with screens and a seed blower.

Aerial surveys were made of Southwestern Louisiana in July, 1962, to locate the best three-cornered grass area for use as a study area. The north shore of Vermilion Bay seemed best suited.

Seed counts from random samples showed an average of 40 seeds per seed head (range 4 to 105) and the average weight of 10 seed heads was one gram. Quadrat counts of seed heads per square foot at Cypremort Point showed that the area produced 288 pounds of seed per acre.

Soil samples were taken at four locations along the Louisiana coast in productive and non-productive three-cornered grass areas. Complete analysis of the soil samples showed no significant difference between the areas with contrasting vegetation and seed production.

MARSH BURNING STUDY

Very little has been done on this project during the past two years. The leader of this study terminated his employment with this section and accepted an advancement with the Federal Aid Section.

One major problem in marsh burning studies in the past has been that we were unable to establish satisfactory fire breaks between plots. In May, 1963, a method was tested which seems very effective in a wet marsh. This method involves the use of a large rotary tiller, mounted on a sled and towed by a marshbuggy. Further tests will be made of the method.

Tentative plans have been made to check further into the changes in soil and vegetation nutritional quality resulting from fires.

NUTRIA PELT STUDY

Annually thousands of acres are burned on Marsh Island to encourage the growth of desirable game food plants.

In March, 1961, a study was begun on Rockefeller Wildlife Refuge, Grand Chenier, Louisiana, to provide information on the monthly variation in nutria pelt quality. The purpose of the study was to compare all factor affecting pelt quality and determine the months which would produce the greatest revenue from a given number of nutria.

Differences have been noted in the quality of nutria pelts at various times during the year, but no detailed studies have been made to determine the exact periods when pelt values were greatest. Since the value of individual pelts is in direct proportion to pelt quality, this study should provide information to trappers and landowners regarding the harvest of nutria.

In similar studies on muskrat (*Ondatra zibethica*) O'Neil stated that Louisiana Muskrat reaches the height of its prime from mid-January to mid-February. Shanks and Arthur found that the value of Missouri muskrat pelts increased by 202 per cent from September to December.

The study extended over 24 months beginning in March, 1961 and terminating in February, 1963. Ten nutria were collected each month, then skinned and the pelts placed in cold storage. This procedure was followed for one year, then all pelts were stretched and dried. A code system was devised whereby individual pelts could be recognized only by an attached number. The length, weight, color, and number of holes were recorded for each pelt. The pelts were then submitted to two local fur buyers for grading. The buyers graded the pelts only on a basis of primeness.

The same procedure was followed for the second year with 10 nutria pelts collected each month.

On a basis of pelt primeness the winter months (December, January and February) produced the largest numbers of top pelts. Of the total 240 pelts taken during the study (20 each month) only 63 had prime fur. Of these 59 per cent were taken during December, January and February. Of all pelts taken during these months, 62 per cent were prime, but during the remaining 9 months only 14 per cent were prime.

Slight differences were noted in the pelt damage for the various months, however this occurred without following any particular pattern. The least number of damaged pelts were in May, June and December. Heaviest damage was found in April and November. Likewise, May and June had the least number of holes per damaged pelt, while July, August and September had the greatest number.

From these data it can be concluded that the amount of damage in nutria pelts may be high or low, regardless of the month taken.

Nutria fur varies in color from a reddish or rust to gray. The value of individual pelts also vary with color of the fur with the dark or gray pelts having the greatest value. During this study a small number of reddish pelts were found each month, but this varied considerably and no relationship was found between the pelt color and month of capture.

Since the value of nutria pelts vary with pelt quality, and pelt quality with the time of year, trappers and landowners, whose primary interests were fur production, would profit to schedule the harvest of nutria until such time as the greatest percentage of animals produced top quality pelts.

A marsh will produce only a certain number of nutria. The harvest will in general be approximately one nutria per acre. With systematic trapping the animals can be harvested within a three-month period each year.

This study clearly shows that on a basis of fur quality the greatest economic return can be gained per unit of effort by beginning nutria trapping in early December and continuing through February. However, should a season longer than 90 days be needed or desired, then trapping could be extended into March.

During the trapping season the largest catches are made at the beginning of the season. Trapping success then drops at a fairly progressive rate throughout the season. Therefore, beginning the trapping season earlier than December would result in the harvest of a large number of low quality pelts. But by waiting until December, pelt values will be at their peak.

ALLIGATOR GROWTH AND MOVEMENT

During 1962 and 1963 a total of 977 alligators were captured. Detailed body measurements were made, then each animal was tagged and released. Information on growth and movement is gathered primarily from the recapture of tagged alligators and during 1962 and 1963, 54 tagged animals were recaptured.

Alligator pens, portion of the alligator research program being carried on by refuge biologists.

The data on growth shows that a newly hatched alligator is 8 inches long. In a year's time, they have more than doubled in length and measure approximately 22 inches. At two years, they are approximately three feet in length, with the average being 35 inches. At three years, the average size is 47 inches and at four years the length averages 55 inches, or just under the legal size limit. In the fifth year, the average length of alligators is 66 inches or half a foot more than the minimum legal length. Six year-old 'gators average 75 inches.

The data shows that alligators have strong homeing instincts and several traveled as much as 8 miles back to the original area where captured.

Alligators were captured both at day and at night, but in general night hunts proved more successful. Not only was it possible to capture more alligators at night but also a wider range of size classes.

The principal method of capturing alligators was basically the same as that used by McIlhenny in 1927. This consisted of night hunting in a boat with a headlight and a strong wire slip noose attached to a stiff bamboo pole. Small aluminum hulls powered by 18 horse power outboard motors were used in most cases during my study for night hunting. An airboat was used in shallow impoundments. One man sitting in the bow of the boat located the alligator by shining its eye with a 6-volt headlight. The alligator was then captured by slowly maneuvering the boat up to the animal and placing a snare, mounted on a stout pole, around its neck, then quickly tightening the snare. Kleflock swivel snares as manufactured by Animal Trap Company of America were used during the study. Alligators less than 6 feet long were captured with the No. 0 snare and placed in regular

Recently hatched baby alligators prepare to leave the nest. A determined effort is being made by the Louisiana Wildlife & Fisheries Commission to rebuild this valuable reptile's populations in suitable habitat throughout Louisiana.

burlap sacks until tagged. Those over 6 feet long were captured with No. 3 snare and immediately towed to the bank, marked, measured then released.

An alligator less than 3 feet long was easily captured at night by quickly grasping it behind the neck with one hand as it swam along on the surface of the water, then pulling it into the boat and grasping the tail with the other hand to prevent the animal from twisting. Alligators were usually taken by this method only under ideal conditions which included: deep water which permitted a rapid and noiseless approach and a night when they were holding particularly well. Nevertheless, when such conditions appeared this method was very effective. One crew captured over 100 alligators on Rockefeller Refuge in a period of about 3 hours using this technique.

Although a number of alligators were live captured during the day, these made up less than 10 per cent of all captured. At this time alligators are very scary and difficult to approach. Most specimens captured during the day were newly hatched animals at the nest site. Alligators hatch in late summer and will remain in the vicinity of the nest at a hole or den with the mother for the first winter. When the hole was approached the young would submerge but then surface after about 10 minutes and could be picked up either by hand or with a dip net. Although there are many stories describing the fierceness of the mother alligator, at no time during this study did females attempt to defend the nest or young.

CANADA GOOSE STUDY

Louisiana at one time wintered large numbers of Canada geese, however, several states in the upper portion of the Mississippi Flyway began employing special management for this species; and as a result, successfully "short stopped" a major segment of the Canada geese flock which wintered in Louisiana.

The method used consisted primarily of planting large corn fields on refuge areas, then leaving the corn in the fields after maturity and simply knocking down only enough corn during the fall and winter to hold the geese in the area. Although this technique afforded excellent sport for hunters surrounding these areas, Canada goose hunters farther south were forced to turn their attention elsewhere.

Although no actual counts were made in the early days, reliable sources have estimated that the "honker" may have numbered as high as 100,000 in Louisiana. Even during the early '40's tremendous flocks were found on the Mississippi River Delta, White Lake and throughout the marsh-prairie transition zone. However, during recent years aerial inventories by waterfowl biologists of the Louisiana Wild Life and Fisheries

Canada Geese used in the transplant program on the Rockefeller Wildlife Refuge were captured by use of Cannon traps on the Swan Lake National Wildlife Refuge in Missouri. Personnel of the Refuge Division assisted in trapping and refuge equipment was used to transport the birds to Louisiana.

Commission, have listed the Louisiana population at approximately 5,000.

In an effort to gather information on the possibilities of establishing non-migratory colonies of Canada geese in Louisiana, a study was begun on Rockefeller Wildlife Refuge. The objectives of this study were:

1. To obtain wild breeding stock and hold them flightless in captivity.
2. To determine the factors associated with pair formation and nesting.
3. To determine the care needed by both adult and immature geese.
4. To determine if young geese will remain in the rearing area to nest if permitted to fly.

In the fall, 1960, following the completion of a large goose holding pen, 27 wild "honkers" were obtained from the Wisconsin Conservation Department and held in the pen and a three-acre enclosure on Rockefeller Refuge. In February, 1961, an additional 34 "honkers" were obtained from Wisconsin and released in the same enclosure. All birds were wild stock but most were cripples that had been picked up afield. The Canadas were sexed, aged and banded at Rockefeller Refuge. Of the 61 geese, 48 were males and 13 females.

During April, 1961, courtship activity was noted in the flock; however, only one pair chose to nest in the three-acre area. From this nesting attempt three young were produced.

During the summer, 1961, an additional 35 acres were fenced adjacent to the goose pen and the entire flock permitted to roam at will.

In March, 1962, courtship activity was again noted and on March 29th, the 1962 nesting season began. Nesting pairs increased to four during 1962 and a total of 25 young hatched.

The latest nesting date was April 26th. Of 27 eggs incubated by the parents, 23 hatched. Of six eggs incubated artificially only two hatched.

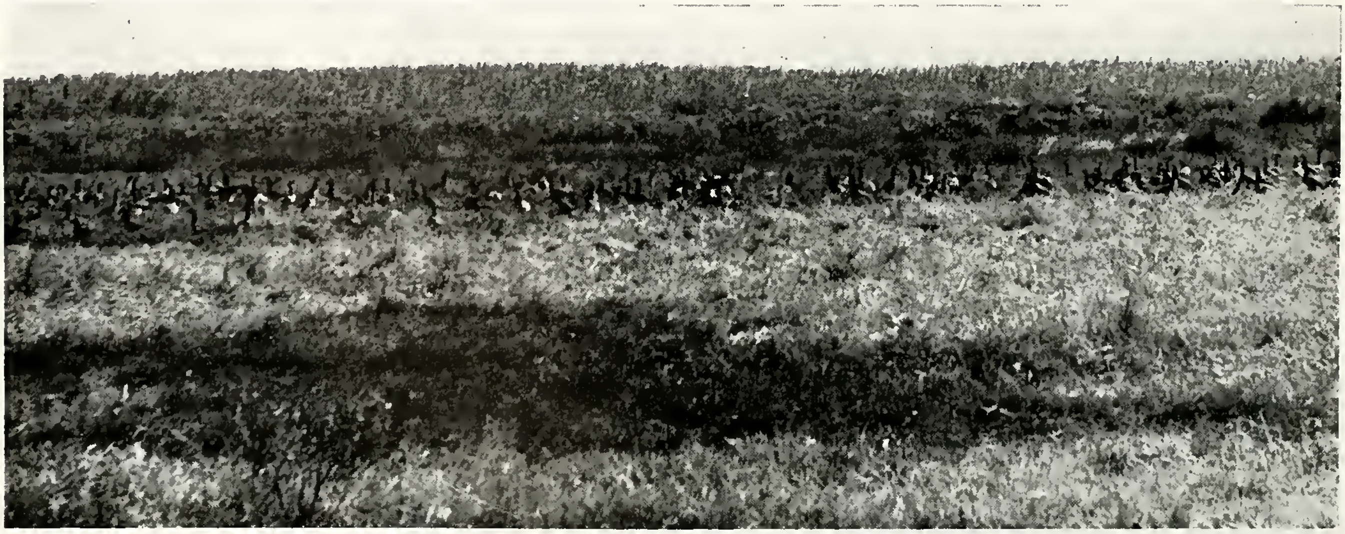
Refuge personnel clipping wings of Canada geese from Swan-Lake Refuge, Mo.

In 1963 nesting began on March 26 and on May 12 the last brood hatched. Five pairs nested in 1963 and of 28 eggs laid, fifteen young were reared. The geese were released on 160-acres for nesting.

Considerable variation was noted among males in guarding the nest. Some males were very brave and would even attack a person that invaded the nest site. Others would slowly walk away. However, no instance of nest predation was noted even though raccoons were known to be in the area.

Mortality among the young geese was minimized by keeping the entire family in close confinement in the goose pen. This area is near the refuge headquarters and visited several times daily by refuge personnel. Only one small goose was lost and this one apparently drowned in a watering trough. Although the young ventured in and out of the trough, the one lost may have been weak and unable to climb out.

Mortality among the young probably would have been higher if the young were left to rear in the wild. Raccoons, alligators or gar fish would have possibly claimed a few.



Portion of the 1,500 wing clipped Canada Geese, Rockefeller Refuge.

In November, 1,500 adult Canada Geese were transported from Swan Lake Refuge in Missouri. The geese were banded, wing-clipped and released on a 1200-acre fenced goose pasture on Rockefeller Refuge. The geese were held through one nesting season and all geese nesting were captured and held as breeders. Those not nesting will be permitted to fly when their flight feathers reappear.

GREBE NESTING STUDY

A large group of pied-billed grebes were found nesting in a small brackish-water impoundment on Rockefeller Refuge. The impoundment encompassed 200 acres of marshland, and between May and September, 107 pied-billed grebe nests were examined in the area.

Factors which seemed to have attracted grebe to the impoundment for nesting included a large area of open water, deep water and a dense growth of widgeon grass.

The nests were placed on open water at an average distance of 197 feet from the nearest stands of dense vegetation. The nests were uniformly distributed on the ponds with no nest nearer than 75 feet to other active nests.

The number of eggs per nest varied from five to nine, averaging 7.3. Of the 107 nests examined 89.6 per cent were successful and of this group 91.3 per cent of the eggs hatched.

Most nest losses were attributed primarily to climatic factors such as heavy rainfall and strong winds. Nest predation was almost nonexistant; however, predators probably claimed a number of the young.

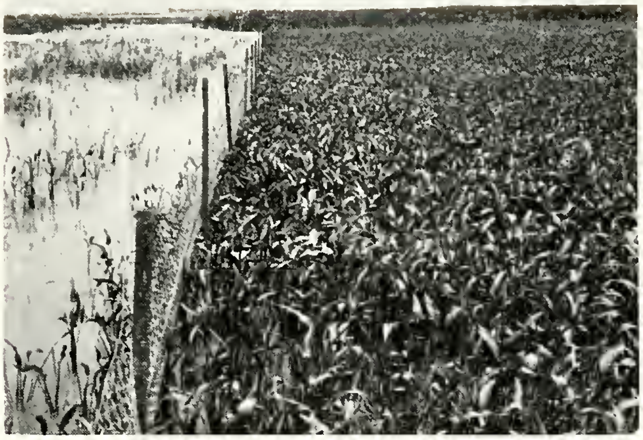
Nesting activity began in late April and the nesting season ended with the arrival of Hurricane "Carla" on September 10. Hatching reached a peak in early June and from May 31 to June 20, 54.2 per cent of the eggs hatched. By June 26, hatching was 83.3 per cent complete.

DUCK POTATO STUDY

Delta duck potato is a major duck food on the Mississippi Delta. At one time this species grew in tremendous stands throughout the area, but in recent years the magnitude of these stands have been greatly reduced.

In 1962, a study was set up by Allan Ensminger, biologist at Pass-a-Loutre for the Refuge Division and Dr. Leslie Glasgow of Louisiana State University. The purpose of this study was to measure tuber production in this species and to determine the factor that affect plant growth and tuber production.

Small plots were established and tuber production sampled periodically. Exclosures were built to exclude nutria, hogs and ducks, and to measure the utilization by these species.



A research study to determine the utilization and production of delta duck potatoes, a choice waterfowl food plant, is being carried out on Pass-a-Loutre by biologists of the Refuge Division. Nutria have been excluded from the area on the right of the fence.

SESUVIUM STUDY

In recent years a small halophytic plant has appeared in tremendous stands on Rockefeller Refuge. This plant is seapurslane (*Sesuvium portulacastrum*) and its spread to new areas has been prompted by the extensive drought in this area and the absence of water in impoundments previously flooded with brackish water.

This species has wide usage by ducks on Rockefeller Refuge and has become a major duck food plant. Yet, very little is known about its growth habits and requirements. In March, 1963, a study was set up to gather information essential for managing this species. During this study checks were made to determine seasonal growth rates, the effects of competition, soil requirement, moisture requirements, salinity ranges, seed production and waterfowl usage. This study will be continued over a period of several years.

COOPERATIVE STUDIES

The Refuge Division is one of the cooperators in the newly created Louisiana Cooperative Wildlife Research Unit at Louisiana State University. Participation by the Refuge Division has not only been financial, but active assistance has also been given to faculty and students in three studies conducted on Rockefeller Refuge. Two other studies were conducted jointly by L.S.U. faculty and personnel of the Refuge Division Research Section. A description of each study follows.

WIGEONGRASS STUDY

The study was conducted by Ted Joanen with Dr. Leslie Glasgow as supervisor. It was a study of the factors that influence the establishment of natural and artificial stands of wigeongrass, *Ruppia martima*, and was conducted on Rockefeller Refuge during 1962-63. Physical, chemical and biotic factors were investigated, growth was measured monthly, and germination of wigeongrass was carried out.

Physical factors such as turbidity, fluctuating water levels and water depth were found to be controlling factors in the establishment of new stands and also to mature stands of wigeongrass. Correlations were found between water depth, turbidity, and vegetative production. The greatest production was obtained at the 24 inch water level. A generalized range of turbidity which will allow wigeongrass growth in ponds with water depth less than 24 inches as found in this study would be from 25 ppm to 54 ppm.

Chemical factors such as per cent of soluable salts inhibited seed germination by increasing the osmotic pressure of the soil solution so that the plants had difficulty in getting water. Salinity of the soil surface zones was the most important because germination and establishment of seedlings was a critical stage which had to take place on the soil surface. Soluable salts present in the soil which exceed 1.12 per cent is extremely harmful to germination of wigeongrass seeds.

The most important biotic factor affecting plant growth was algae cover. Algae overshadowed and crowded out wigeongrass by taking most of the light. It was also observed that waterfowl utilization was reduced in these areas. Control of this undesirable plant was tried by stocking mullet (*Mugel cephalis*) at different stocking rates to see if these algae eating fish could serve as a means of natural control. Only one tank was successful in obtaining results in controlling algae and producing a desirable stand of wigeongrass.

Wigeongrass was observed growing in a wide range of salinity from 2,054 ppm to 18,500 ppm in the study ponds and 1,160 ppm and 19,000 ppm in the experimental tanks. There was no correlation between chlorides and growth of wigeongrass.

Water analysis and soil chemistry, other than the above mentioned, proved to be of little significance as factors which inhibit plant growth.

POND CULTURE OF SHRIMP

The study was conducted by Wendell Lorio with Dr. R. J. Muncy as supervisor. The objectives of the study were:

1. To develop methods for filling impounded areas with saline waters and eliminating predaceous fish and crabs.
2. To develop methods for stocking impounded areas with juvenile shrimp.
3. To determine optimum stocking rates for shrimp in impoundments.
4. To determine growth rates and mortality of stocked shrimp.
5. To analyze the food contents of preserved shrimp stomachs.

The study was conducted in six experimental ponds on Rockefeller Refuge. On May 10, 1963, the southwest, northwest, and northeast ponds were treated with 2 p.p.m. rotenone. The three remaining ponds were not treated with rotenone prior to stocking. One of the latter ponds had filled by water seepage through the water control structure; therefore, it was free of fish at that time.

Stocking of all six ponds with the allotted numbers of brown shrimp was completed by June 20, 1963. Three ponds (northern) were stocked at 400 pounds per acre or 3333 shrimp per 1/3 acre pond. Three ponds (southern) were stocked at 600 pounds per acre or 5000 shrimp per 1/3 acre pond. Average length of shrimp stocked was 40 millimeters. One hundred striped mullet were stocked in the northwest pond for the purpose of increasing turbidity and thereby limiting the growth of wigeongrass and algae. Brown shrimp (*Panaeus aztecus*) and striped mullet (*Mugil cephalis*) were obtained from wild stock in the canals on the refuge.

Information from 1962 stocking rates indicates that the optimum stocking rate may be between 10,000 and 15,000 brown shrimp per acre or 400 to 600 pounds at harvestable size. Between these rates better growth and survival was obtained in 1962. Stocking rates during 1963 will provide more data on this objective.

All ponds were sampled on June 26, 1963, to determine growth rates. The shrimp stocked earlier appeared to have doubled their length since the time of earliest stocking. Mortality could not be determined with this first sample.

Stomach analyses of the shrimp preserved from last year has been continued. Large specimens consistently contain very little in their stomachs. The implications of these findings are not clearly understood.

FOOD HABITS OF COMMON SNIPE

This study was conducted by Clifton Whitehead with Dr. Leslie Glasgow as supervisor. The objectives of the study are:

1. To determine food habits of snipe from October through April.
2. To determine kinds and quantities of foods available to snipe from October through April.

3. To determine the chronology of snipe activities—i.e., feeding, traveling, resting.
4. To determine external aging and sexing characteristics for snipe.

Snipe were collected in the vicinity of Rockefeller Refuge during the winter 1962-63. The stomachs were removed and preserved for future analysis. Also, soil samples were taken to determine the food available for snipe. Observations were made of snipe feeding habits and a method devised whereby snipe could be sexed and aged by external examination.

MARSH CULTIVATION TO REMOVE COMPETITION

This was a joint study by L.S.U. faculty and personnel of the Refuge Division Research Section. The study involved the use of a soil tiller in the marsh as a means of controlling undesirable marsh plants thus stimulating more desirable species and was used on Rockefeller Refuge. Sample areas were selected at random in the marsh and a soil tiller was used to cut strips four feet wide and 200 feet long. Several months later another strip was cut next to the earlier strip. The marsh bordering the first strip was used as the control area. These strips were sampled in August, 1963 using the square foot quadrat method. Five samples were taken on each strip.

Efforts were directed toward the elimination or reduction of plant species such as wiregrass and saltgrass and encouraging the sub-climax plant three-cornered grass and saltmarsh bulrush.

Although this study is not yet completed the limited results show this method served as a means of controlling undesirable plants on all strips sampled. One sample showed the root stock and basal stems were reduced as much as 2½ times as much as the control area.

The project is in the experimental stages and final results will not be realized until the summer of 1964.

ANIMAL CENSUS

In cooperation with the Louisiana State University Cooperative Wildlife Research Unit, an experimental census method was tried on Rockefeller Refuge. Two, 2½ acre plots and one 5 acre plot were chosen and a rotary tiller was used to establish five lanes around each area. Poultry netting 3 feet high was erected around each plot and live traps were set at 50 feet intervals along this fence. Students from L.S.U. School of Game Management were used as spotters counting the animals as they were pushed out when each plot was burned.

Efforts were directed toward obtaining a complete count on each area burned. This method is still in the experimental stages, but offers much possibility for nutria, rabbit and rail census in coastal marshes.

WATERFOWL USAGE STUDY

In September, 1963, a study was begun with the primary objective to relate water depth, salinity, vegetative composition and vegetative coverage to waterfowl usage. The study was conducted on Rockefeller Refuge, using the entire refuge as a study area.

Ten impoundments have been constructed on Rockefeller Refuge since 1954. The impoundments serve primarily as feeding and resting areas for migratory waterfowl. Although each impoundment is handled separately, three principal types of management are used. These are permanently flooded brackish water, permanently flooded freshwater and manipulated freshwater.

The impoundments and adjacent control areas are sampled annually to determine the vegetative composition of each. Also, monthly records are kept on water levels and salinities of each area. However, information is needed on waterfowl usage of each impoundment. With information on the vegetative composition, water conditions and waterfowl usage of each impoundment, definite plans can be formulated for the management of the impoundment. Not only will it be possible to determine the management systems preferred by various waterfowl species, but the study will determine if the needs of all species are met by the management systems now employed on Rockefeller Refuge.

This information will also be valuable when making waterfowl management recommendations to private landowners.

Numerous food habit studies have been made in the vicinity of Rockefeller Refuge. These studies list the foods commonly found in duck gullets in the Grand Chenier area. While this information is valuable in indicating preferred foods, it is unrelated to other factors which attract waterfowl to an area, such as water depth and food availability, cover, resting, area, etc.

Studies on Rockefeller Refuge show that about 20 per cent of the seeds available to ducks during the fall are eaten before spring migration. However, wigeongrass and dwarf spike-rush vegetation are completely eliminated in many areas by spring.

During this study, Rockefeller Refuge wintered approximately 600,000 ducks. About 80 per cent of the ducks were found in the impoundments.

Beginning in September, 1963, bi-weekly aerial waterfowl inventories were made in each impoundment and control area on Rockefeller Refuge. Also, sampling was done to determine the plant species composition of the area. Monthly checks were made on water depths and salinities.

SARCOSPORIDIOSIS IN DUCKS

A study begun in 1960 on Sarcocystis infestation of ducks in southwestern Louisiana was continued during 1962 and 1963. The primary objective of this study was to determine the occurrence rate of the parasite in various species of waterfowl. The occurrence was also listed by sex and age classes and each duck checked was weighed to determine its condition.

The organism itself is a microscopic spore, crescent-shaped with one end rounded and the other pointed and having a nucleus and many granules in the cytoplasm. The spores occur in colonies and are enclosed in a cyst membrane.

In the host the cysts appear as elongated white bodies, much like grains of rice, and vary in size from microscopic to one-quarter inch in length. The cysts are imbedded in skeletal muscle, between the muscle bundles and lying in the same general plane as the muscle fibers. In infested birds these bodies may be found in either the breast, wing or leg muscle tissue and are clearly visible when the skin is removed.

During the 1961-62 hunting season 304 ducks were examined and during 1962-63, 308 were examined. Check points were primarily the hunting clubs near Creole.

Of the ducks examined during the 1961-62 season 35.2 per cent had Sarcosporidiosis, but the following year this figure dropped to 19.7 per cent. Adults of both sexes were host to the parasite in similar proportions. In 1961-62 males showed a 42.6 per cent infestation and females 37.6 per cent, while in 1962-63, 33.1 per cent of the males and 30.9 per cent of the females had Sarcosporidiosis.

The parasite was found almost entirely among adult ducks. In 1961-62 of 71 young examined none contained the parasite and of 146 in 1962-63 only 2 contained it.

WATERFOWL INVENTORY

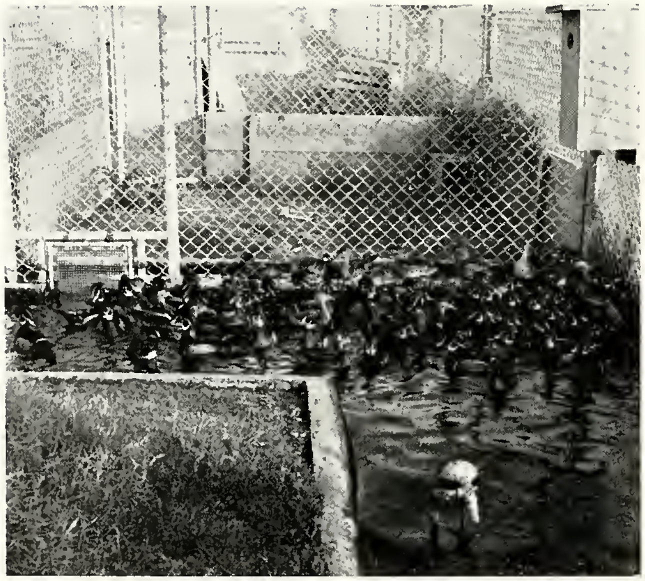
Periodic waterfowl inventories were made on Marsh Island and Rockefeller Refuge (see tables). Commission personnel made the aerial surveys at bi-weekly intervals throughout the wintering season.

The inventories provide information on arrival dates and waterfowl usage of the refuges. Also, a comparison between years shows a long range trend of waterfowl usage. In addition the inventories show the various species using the refuge and serves as an evaluation of various management practices.

WILDLIFE EXHIBIT

Located near the Rockefeller Refuge headquarters site are animal pens, housing the captive ducks, geese, alligators, and other animals collected on the refuge. The animal pens are used as part of the refuge research program. In addition people passing by the refuge headquarters on the Pecan Island-Grand Chenier highway are invited to stop and observe the captive wildlife. A waterfowl collection has been made of all the ducks and geese that winter in Louisiana and is on display in these pens.

Identifying characteristics of the waterfowl have been attached to each pen in an effort to aid the public in identifying these birds in the field. The waterfowl exhibit at Rockefeller Refuge is one of several exhibits in Louisiana to assist hunters in learning the various species.



Captive wood duck flock on Rockefeller Refuge. Annually the young birds are released on the refuge.

Water Pollution Control Division

"The right to development and legitmate uses of our natural resources, particularly water, is an inherent one; the question, if or not one has a right to cause water quality degradation is not or should not be negotiable."

The nerve center around which water pollution control revolves in the State of Louisiana is domiciled in the Geology Building on the Louisiana State University Campus at Baton Rouge, Louisiana. The location of the administrative offices and laboratory facilities on the campus is, although possibly fortuitous, quite convenient and useful. Access to the university library and availability of university professors and other highly trained technical persons for consultation is a most valuable adjunct to being located on the university campus. By legislative act the legal domicile of Louisiana's water quality authority, the Louisiana Stream Control Commission, is in the Nineteenth Judicial District, Baton Rouge, Louisiana.

The Water Pollution Control Division serves as the enforcement and investigative arm for both the Louisiana Wild Life and Fisheries Commission and the Louisiana Stream Control Commission. Presently the division is staffed with three biologists, one of whom serves as chief of the division, and also as executive secretary to the Louisiana Stream Control Commission. The other biologists conduct field and laboratory investigations of both a chemical and a biological nature. Additionally, the division's laboratories are staffed with two chemists either or both of whom can, or do, double as bacteriologists as the need arises. One engineering aide attached to the Division of Oysters, Water Bottoms, and Seafoods conducts chemical analyses in the Water Pollution Control laboratories. To complete the staff description, eight waste disposal inspectors are geographically located throughout the state. These men conduct, or maintain, the day-to-day routine surveillance on streams throughout the state. Finally one stenographer-clerk handles clerical duties of the division office.

ROBERT A. LAFLEUR
Chief

During the calendar year 1962 the Water Pollution Control Division was engaged in the following activities:

1. Completed an eighteen month survey of Pearl River for the purpose of submitting water quality standards on that stream to the Louisiana Stream Control Commission.
2. Continued monitoring of progressively reduced brine discharge to the Ouachita River from Arkansas.
3. Maintained surveillance on and continued a survey on the Mississippi River.
4. Assigned a biologist, equipped with a mobile laboratory, to streams in the New Orleans area for assaying and surveillance purposes.
5. Maintained close surveillance on streams in the cane grinding area. Pollution was at a minimum despite low water conditions occasioned by a serious lack of rainfall.
6. Initiated a biological and chemical survey of the Calcasieu River.
7. Maintained a close surveillance on surface waters in the rice irrigation area of the state. This work resulted in filing and obtaining five court convictions for illegal oil field brine discharge.
8. Continued a state-wide water quality program wherein some twenty of the state's major water sheds were sampled at approximately forty sampling points.
9. Provided technical information as required for five stream control Commission meetings.
10. Recorded only one fish kill resulting from pesticides.
11. Provided the State Health Department with assistance in laboratory analyses of municipal sewage treatment effluent discharges.

During the calendar year of 1963 the division has been engaged in the following acitivities:

1. Continued surveillance of the Mississippi River from Baton Rouge to New Orleans and intermittently to the mouth of the river.
2. Continued surveillance of the Ouachita River for progressively reducing brine content.
3. Continued the state-wide water quality program initiated in mid-1958.
4. Gathered pertinent data relative to pollution of the Atchafalaya River Basin. This information was used in the Louisiana Wild Life and Fisheries Commission efforts in this river basin.
5. Maintained close surveillance on the state's water in the sugar cane grinding area. (Virtual total lack of rainfall has contributed to serious and very undesirable stream conditions in this area.)
6. Provided the Louisiana Stream Control Commission with technical information for its six meetings.
7. Prepared for and participated in a conference called by the U.S. Public Health Service relative to pollution of Pearl River.
8. Continued an intensive investigation into the perplexing cause of a large scale fish die-off in the Mississippi and Atchafalaya Rivers.
9. Conducted investigations of numerous severe fish kills wherein pesticides were either the cause or the suspected cause.
10. Completed the third brine discharge inventory of oil producing operations in the Little River Basin. This is to be presented to the Louisiana Stream Control Commission for its consideration and possible action.

The division was fortunate in obtaining certain very complex laboratory equipment with which chemical analyses will be conducted on water and other liquid waste samples when taste and odor causative agents are suspected, or are known to be present. This equipment will also have an application in the identification of pesticides. In both of the aforementioned cases detection of pollutants at extremely low concentrations will be facilitated; this has been impossible in the past by reason of the fact that conventional methods of analyses are not sensitive at very low concentrations.

ENFORCEMENT ACTIVITIES

The Division of Water Pollution has, under provisions of Louisiana Revised Statutes of 1950, Title 56, Section 322 and 362, filed at least six charges in various district courts. Action in the aforementioned cases were finalized without, and prior to, court procedure. Under provisions of Act 203 of 1952 (R.S. 38:216) at least twelve charges have been filed alleging violations of this law, which for nine months of each year rigidly controls and expressly prohibits discharge of salt water into surface waters in agricultural irrigation practices. Three of the charges filed have resulted in imposing fines on oil field operators.

Pollution from industrial operations and from use of chemical pesticides in agriculture are two major sources of fish kills such as the one shown. Here countless thousands of fish have perished. Commission activities are aimed at pinpointing the cause of such fish kills and in preventing them. With industrial expansion and widespread use of pesticides and insecticides, fish kills have become more common in recent years, and present a threat to the health of the people of the state, as well as recreational sport.

With respect to enforcement proceedings initiated by and for the Louisiana Stream Control Commission, six Notices of Determination have been issued to offenders in cases of stream pollution. These cases were settled in a manner acceptable to the Louisiana Stream Control Commission. Beginning in January 1963, the Louisiana Stream Control Commission, through its enforcement arm, the Division of Water Pollution Control, and the Louisiana Department of Conservation initiated a pollution abatement program wherein inspections of oil producing facilities were conducted. Where and when violations of pollution laws and regulations were noted, the oil field operators were notified and requested to institute remedial measures. Results of this program were, for the most part, satisfactory; yet, it remains a fact that much more is needed in this regard before one could say that Louisiana's surface waters are free of salt water from oil producing operations. There are, of course, many types of pollution in the state in addition to salt water. Paper mills, for example, are responsible

Impounding basin for paper mill waste, International paper Company, Bastrop, Louisiana.

in some instances. At least eight paper mills operate in Louisiana and to date, with one or two exceptions, this industry has provided, and continues to provide, increasing amounts of waste treatment. Raw sugar factories, of which 46 are operating in Louisiana, have provided much in the way of waste treatment. In fact this treatment is limited, at present, by the knowledge of technology of control. Further, many of the factories are handling their waste in such manner as to cause no known, or detectable, pollution problems.

The food processing industry has made great strides in waste treatment, but again, more efficient treatment is presently limited by technology of control.

Within the past decade Louisiana has taken its place among the leaders in the field of chemical and petrochemical industrial development. Many, or most, of the highly complex organic waste materials being discharged from these industries present problems which science presently knows woefully little about in regard to their effect on water quality and aquatic life, save the fact that at extremely low concentrations taste and odor problems are created if they are discharged to waters serving as a source of municipal or domestic supply. One encouraging note is the fact that in increasing instances wastes, as were just described, and an ever-increasing amount of oil field brine is being injected to sub-surface strata, thus causing no pollution problems.

This close-up photograph of a typical fish kill reveals the shocking loss of aquatic life which follows unwise use of chemical pesticides and insecticides or harmful industrial chemical waste from industrial sources. Constant sampling of fresh water streams and lakes is providing clues to the cause of extensive fish kills. Industrial waste is a major factor in some areas.

ANTI-POLLUTION LAWS

No governmental agency, particularly at the state level, could long exist if it desired, and chose to work toward the detriment of any community or industry in the state. However, our task is pollution control and abatement and if enforcement is necessary, then, so be it. Let all be aware that pollution abatement and control is a *must* and needs to be accomplished if we are to insure our very survival. In the light of the aforegoing statements, an appraisal of Louisiana's water pollution control laws appears warranted. Because of a number of developments within the past two or three years, it is believed that a practical appraisal of the problems related to enforcement of water pollution violation needs to be discussed. The following are of necessity recognized:

1. Increasing segments of the public have been exposed to the moral problem of water pollution, and are demanding, consequently, increased legal action.
2. Conflicting laws pertaining to enforcement of legal action are on the statute books.
3. The Louisiana Stream Control Commission has long needed, but as yet not established, classification of situations that should come under their regulations for enforcement. Examples of this situation are:
    a. The Stream Control Commission has promulgated rules and regulations pertaining to oil, sulphur, and raw sugar producing industries only. The commission has legislative authority to bring all public surface waters under its jurisdiction and similarly all types of wastes. (RS 56:1433 to 1439.)
    b. There are three anti-pollution statutes which could be enforced by any peace officer for the reason that they constitute criminal offenses. They are RS 56:322, RS 56:362, and Act 203 of 1953 (RS 38:216).

Independent enforcement actions under RS 56:322 and RS 56:362 have been attempted or utilized on at least six occasions since 1959. These actions were independent to the extent that the Louisiana Stream Control Commission did not vote on the action before it was taken. The commission chairman and the attorney general were appraised of the action, however.

Comment on Louisiana Stream Control Commission Statutes RS 56:1431-1445, 322 362, and Act 203 of 1952:

The original Stream Control Commission statutes encompass RS 56:1431-1453, however, Act 203 of 1952 repealed 1451, 1452, and 1453. The repealed laws related to, or dealt with drainage of oil, salt water, and other noxious substances to state waters. In compensating the Louisiana Stream Control Commission promulgated a set of regulations in January 1953, governing the disposal of waste oil, oil field brine, and all other materials resulting from drilling for, production of, or transportation of oil, gas, or sulphur. During certain parts of the year Act 203 (RS 38:216) is in direct conflict with these regulations because it provides an "open season" for discharge of oil, salt water, and other noxious or poisonous substances into natural drains from which water is taken for irrigation purposes. The act does not provide for protection of human life, wild game, fish, agricultural interest, or water used by municipalities or industries during the "open season" of discharge from October 1 through December 31 of each year. Also the act specifically states that its prohibition shall not prevent the discharge of these materials from sources outside the State of Louisiana.

Waste impoundment for raw sugar factory, Greenwood Factory, Thibodaux, Louisiana.

The state lost a case involving a paper mill discharge (*State of Louisiana vs. Calcasieu Paper Company,* No. Cr-152-59) because the defendant successfully claimed freedom to discharge noxious waste under Act 203 of 1952. The charge was filed under provisions of RS 56:322, a statute that has been described by the court as vague and nebulous. RS 56:326 and RS 56:322 should now be discussed. Both of these 1950 laws read identically. Repetition of verbage in the two statutes is understood by reason of the fact that section 322 pertains to sports fishing while Section 362 pertains to commercial fishing. In the case of *State of Louisiana vs. Calcasieu Paper Company,* the judge's decision to quash charges was based on two reasons: (1) Act 203 of 1952 has caused the repeal of this 1950 section, and (2) RS 56:322 and 56:326 only generally characterize, or denounce, the offense for which the defendant was charged. In so many words, the court felt that Act 203 of 1952 has caused RS 56:322 and 56:326 to no longer be judicially active, and even if these sections were active, they are so general as likely to be declared unconstitutional by the State Supreme Court. This latter statement is made by inference gathered in the court's decision.

RS 56:322 and RS 56:326 are still being utilized by wild life agents, however, there is understandable apprehension on the part of agents filing charges with the district attorney and the attorney for the Louisiana Wild Life and Fisheries Commission each time these sections are used.

The original Louisiana Stream Control Commission was created by the legislature in 1940. By amendment in 1942, the legislature added the Commissioner of Agriculture, the Director of Commerce and Industry, and provided that the attorney general would serve as legal counsel for the commission. The constitutionality of the commission was tested in 1947 in the case of *Texas Company vs. Montgomery* before a Federal District Court. The court held that this is a power vested in, and only in, the legislature. No decision was rendered on this matter by virtue of there being no question or criminal action before it.

Using commission statutes, the enforcement route for routine policing is both tedious and time consuming. A Notice of Determination must first be served on an offender, who has ten days in which to answer this notice. It is required that, in writing, the alleged offender must indicate what remedial measures must be taken to stop pollution. If the answer is acceptable to the commission, no further action is taken. In the event such an answer is unsatisfactory, a hearing is held to hear grievances offered by the alleged offender. Only after such a hearing can criminal charges be filed, and they, then, must be reviewed "de novo" in the Nineteenth Judicial District Court in East Baton Rouge Parish. The attorney general must take charge of and prosecute all cases arising out of violations of these sections. This route is often frustrating to our agents, when they see their fellow officers file direct charges on game and fish violators. Commission action is very definitely desirable when policy on a water shed or a particular waste is needed, but in routine enforcement, faster action is, on occasion, desirable.

In the light of the aforegoing discussions it appears desirable that pollution enforcement agents be instructed by the commission on policies of enforcement. Under present conditions it might be advisable for: (1) All agents to independently enforce Act 203 (RS 38:216) without prior commission approval. If this is to be the case, inadequacies of this section should be clarified by amendment (this was unsuccessfully attempted in the 1959 session). (2) RS 56:322 and RS 56:362 should be dropped as enforcement laws in the light of their apparent repeal by RS 38:216 and also by reason of undesirable generality and vagueness. (3) The attorney general's office could authorize, by letter, the various district attorneys, the filing of criminal charges under the various Stream Control Sections (1440 and the second paragraph of 1441) after a determinate notice and a hearing has been held.

FEDERAL LEGISLATION

Legislation currently pending in Congress include a number of bills. The most important piece of legislation is Senate Bill 649. At this writing S 649 has been favorably voted on by the U. S. Senate and is to be considered by the House of Representatives. This bill has a number of provisions; the most undesirable sections relate to empowering a federal agency with the authority to promulgate water quality standards on virtually all surface waters in the nation. It is the judgment of many state agencies, the State and Interstate Water Pollution Control Administration, and others that it is most unwise to delegate such powers to any federal agency. In effect, it would appear the present provisions of Public Law 660 empowers the federal water pollution control agency with at least sufficient authority. Additionally, water quality standards promulgated by a federal agency would, it seems, be extremely difficult to enforce and might, in many instances, be unrealistic and impractical. Traditionally, authority for such enforcements has been vested in government at the state level; this is where it properly should remain.

LOUISIANA'S RIVER BASINS

The Pearl River on the state's eastern border was the subject of a U.S. Public Health Service Conference in October 1963. Industrial and municipal waste treatment facilities are presently in use and/or under construction.

The Bogue Falaya, Tchefuncte, Tangipahoa, and Amite rivers are, for all intent and purposes, free of industrial pollution. Gravel mining operations during the past two years have caused progressively less water quality degradation. Municipal waste treatment is currently being provided at Hammond, Louisiana, and Independence, Louisiana.

The Mississippi River receives both treated and untreated industrial waste discharges from a number of industries from St. Francisville, Louisiana, to below metropolitan New Orleans, Louisiana. Considerable quantities of untreated municipal wastes are also being discharged to this river. Surveillance is constantly maintained on this river. Some incidents of pollution have been reported and observed. Every effort is being made to at least maintain water quality at acceptable standards for municipal consumption and industrial uses.

The Atchafalaya River receives no industrial waste save some from oil field brines but without detectable damage. Municipal wastes going to this river are of little or no consequence. Water quality is considered very good.

Bayou Teche and the Vermilion River are, and have been, by virtue of lack of rainfall, among other reasons, at extremely low flow conditions. Resultant stagnation and seasonal pollution have caused undesirable conditions in these two streams.

The Mermentau, Calcasieu, and Red rivers have for the most part been in good condition for the past two years. In the case of the Ouachita River, water quality has improved and continues to improve. Waste treatment for paper mill discharge is presently being provided for the first time. Reports indicate that pounds of chlorides in the Ouachita River from Arkansas have dropped from 138 million pounds per month in July 1958 to 47 million pounds per month in July 1963. Oil field brines going to the Ouachita from contributaries of that river in Louisiana have dropped markedly in 1963 because of complete brine sub-surface injection in the Ora Field, Union Parish and Bayou L'Outre.

Salt content in the Little River Drainage Basin continues to be a vexing problem. This matter is presently under consideration by the Louisiana Stream Control Commission.

Smaller streams such as the Black and Tensas rivers and other rivers are relatively free of pollution and provide an excellent quality of sport and commercial fishing.

CHEMICAL SECTION

A subject of great national and state concern is that regarding the status of our natural resources. One of these resources, water, the greatest resource present in the State of Louisiana, continues to increase in importance as more individuals realize the great potentials afforded by our many waterways; still others realize the tremendous loss which can result if our waterways are rendered unfit for consumption, navigation, recreation, or industrial use.

During the early years of this century it became quite obvious that some satisfactory method or methods were needed to dispose of various amounts and types of waste matter, both domestic and industrial. The most acceptable procedure at that time was to dilute the waste material in natural waters. However, due to tremendous increases in population and the development of fantastic industrial complexes, it was soon realized that this "dilution method" was quite inadequate. These relatively uncontrolled and uncoordinated efforts, whether due to a lack of technical knowledge or economic restrictions, resulted in the near destruction of the usefulness of some waters for municipal, recreational, agricultural, and industrial purposes. This aroused a public demand for an agency or commission capable of and equipped for eliminating the gross contamination of our streams.

The State of Louisiana, in response to public demand has placed the responsibility of sampling and conducting both chemical and biological analyses of its many waterways on the Division of Water Pollution Control, a Division of the Wild Life and Fisheries Commission. This organization has been built around two laboratories, which are located in the Geology Building, situated in the center of the Louisiana State University campus in Baton Rouge, Louisiana. The principle function of these laboratories is to conduct various chemical and biological tests on all samples submitted to this organization by investigating teams from this office, Waste Disposal Inspectors, individual citizens, and many industries.

The staff of this laboratory, which includes biologists, bacteriologists, chemists, biochemists, and engineers, interprets and evaluates the data obtained from these tests in conjunction with all other known factual information. The conclusions and recommendations of this scientific group are then disseminated to the individual or industry concerned.

Generally, the three major questions confronting this organization are:

1. What effect will the discharge of a given volume of a specific waste product have upon the physical, chemical and biological properties of a stream?
2. What type of waste treatment is necessary before said substance can be discharged into a stream?
3. How long will it take a given stream to recover from the discharge of this substance?

A second function of the laboratory, which is of equal importance, is the accumulation of Base Line Data from the major waterways of the State of Louisiana. This subject of Base Line Data will be more fully explained in another portion of this report.

During this past biennium, thousands of samples have flowed into the Baton Rouge laboratories for various types of analyses. Some of the types of industrial wastes studied are as follows:

1. "White Water" and wash and process waters from pulp and paper mills.
2. Meal waste and wash water from cottonseed products mills.
3. Washing and rinse water from laundries.
4. Influents and effluents from septic tanks.
5. Wash waters, spoiled fluids, and paunch contents from slaughterhouses.

6. Process and wash water from canneries and food processing plants.
7. Process and wash water from sugar mills.
8. Process water from naval stores.
9. Acid or alkaline wastes from chemical industries.
10. Brine wastes from petroleum fields.
11. Sulphur containing waters from mining operations.
12. Toxic wash waters and liquors from metal plating and chemical industries.
13. Silty residues from washings in gravel pits.
14. Tarry and oily residues from petroleum industries.
15. Phenolic wastes from petroleum and chemical industries.

From the above enumeration of materials received by the laboratory it can readily be seen that industry may introduce into our waters organic or inorganic wastes in either a dissolved or particulate state.

Without a doubt, the most desirable method of handling industrial wastes is to recover these wastes for use or reuse. However, in the majority of cases this is not economically feasible. Therefore the primary requisite in solving a pollution problem or in selecting a method of treatment prior to discharge is knowledge of the physical state and chemical composition of the waste.

The investigators in the field of waste control employ many techniques and types of analyses in accumulating the data necessary for obtaining adequate solutions to the many problems confronting this organization.

One of the basic tests performed is the determination of dissolved oxygen (DO) content in receiving waters. Employing the sodium azide modification of the Winkler Method, the investigator is able to determine whether or not sufficient dissolved oxygen is present in an environment to maintain aquatic fauna.

In order to understand the happenings of natural self purification of streams, biological oxidation, it is necessary to keep in mind the fact that the same dissolved oxygen used to maintain fish and other aquatic forms of life also supports the growth of enormously large populations of microorganisms (bacteria). These microorganisms utilize this dissolved oxygen in stabilizing (decomposing) the organic wastes mixed in the receiving water.

The most important single determination used for the analysis of decomposable organic matter by means of aerobic biochemical action is referred to as the Biochemical Oxygen Demand (BOD). This BOD analysis furnishes the investigator with a means of determining the amount of oxygen required by microorganisms to decompose (stabilize) a given amount of waste matter. The numerical value of this test is usually expressed in parts of oxygen per million parts of waste matter.

A staff member checks titration procedures for running BOD.

The data obtained from BOD and DO analysis make it possible to calculate, with a fair degree of accuracy, the ability of a stream to assimulate wastes of different composition. There are, of course, many other factors that must be taken into consideration, such as: (1) thoroughness with which the waste is mixed with the water; (2) changes in the solubility of oxygen in water with changes in temperature, the former increasing as the latter decreases; (3) lowered microbial activity with a decrease in temperature; (4) rate of flow of the receiving stream; (5) changes in the solubility of oxygen in water with an increase of soluble salts; (6) variations in the concentration of waste matter.

Briefly, the procedure used in carrying out a BOD analysis is as follows: various quantities of the sample to be tested are prepared in duplicate. These are then mixed with water which has been saturated with oxygen (dilution water). The dissolved oxygen (DO) is immediately determined on one-half of these samples. The remaining half of the duplicate samples are placed in a constant temperature room where they are allowed to incubate for five days at 20°C. Following this period of incubation the residual dissolved oxygen is then measured and the BOD values are computed.

It may be worthy to note at this time that the laboratory of the Division is one of the two (2) known laboratories in the state which is capable of and equipped for conducting this type of analysis. Table No. I gives an indication of the number of BOD analyses completed during this past biennium. These figures reflect a 2.1 per cent increase over the number of samples run in the period of 1960-1961 and 44.6 per cent increase over the number run in 1958-1959.

Table No. 1

BOD ANALYSES

1962-63

Source of Sample	*Number of Samples Analyzed*	*Per Cent of Total*
Sugar Mills	474	18.80
Municipal Sewage	277	10.99
Food Processing Plants	242	9.61
Mississippi River	175	6.95
Slaughterhouses	92	3.65
Pine Products Plants	31	1.24
Cotton Seed Oil Mills	57	2.27
Paper Mills	199	7.89
Petroleum & Chemical Plants	41	1.62
Miscellaneous Water Bodies	932	36.98
TOTAL	2,520	100.00

These industries burdened with inorganic waste products have a problem of a somewhat different nature. Normally, inorganic wastes are not subjected to any biological treatment because of their relatively inert nature as a substrate for microbial development. In addition, the discharge of these wastes, because of high alkalinity, acidity or toxicity on microorganisms, may so upset the natural balance of life in waters that natural biological purification cannot progress normally. Therefore, these wastes are usually controlled by physical or chemical separation.

Total solid analysis in water involves careful weighing to the fourth decimal on this Sartorius balance.

Authorities in the waste water profession have noted the increasing amounts of exotic or unusual wastes being discharged into streams. Further, the quantity of these materials is such that they cannot be measured reliably by past analytical methods. Certain of these wastes may have acute or possibly long term effects on the fish in the involved stream.

Discharge of waste waters containing trace quantities of pollutants, even after extensive treatment, provides a very definite need for instrumentation to attain the necessary check on water quality. Only a few years ago concentration ranges of interest were milligrams per liter of pollutant. This is equivalent to approximately 0.000002 pounds per gallon. Although this seems to be an unreasonably low number, it represents an amount detectable by classical chemical methods.

Today, because of the reasons mentioned above, concern is with concentrations of micrograms per liter and millimicrograms per liter. This is respectively equivalent to approximately 0.000000002 pounds per gallon and 0.000000000002 pounds per gallon. These values are very low and, in fact, cannot be detected by chemical means alone.

The best example of this is current interest in pesticides. Some insect killers are considered virtually insoluble in water, yet, they are lethal to fish in water which has been exposed to insecticide. In truth, the poison is soluble in water but only in extremely small amounts. Advanced analytical technique employing very high sensitivity has established this. Water which once was "clean" according to older classical methods can now be shown to contain harmful elements.

To obtain sufficient quantities for analysis initial emphasis and research has been directed toward development of methods to concentrate total trace quantities of materials. The most accessible method for this is liquid extraction.

Liquid extraction methods involve shaking a water sample with a solvent that does not mix. Both water (upper liquid) and solvent (dark lower liquid) can be seen.

Slow liquid extractions may be conducted in this special glass apparatus, a return flow still.

It involves using an organic liquid which does not mix with water and which dissolves the water contaminants better than water does. For this, our laboratory has chosen several organic solvents. Depending on specific demands, the choice of solvent is either benzene, petroleum ether, ethyl ether, carbon tetrachloride, hexane, or pentane.

To extract and concentrate a substance from water, the sample is put in a special container and shaken repeatedly with small volumes of solvent. Each time this is done the contaminent in question leaves the water and dissolves in the solvent which can then be easily evaporated. Using this technique allows the trace material in large volumes of water to be collected in very small volumes of organic solvent.

Occasionally, numerous repeated extractions are necessary. If this is so, special glass apparatus is used to recycle the same pure organic solvent through a water sample. By continuous distillation, the organic distillate is passed through the water sample and collected in the distilling flask, concentrating the toxic material at that point. After evaporating the solvent, a concentrated residue of the toxic material is left.

With the concern over smaller concentrations of contaminants has come the demand for instrumentation which was considered impossible or impractical only a few years ago. Sophisticated methods of measurement and analysis are required.

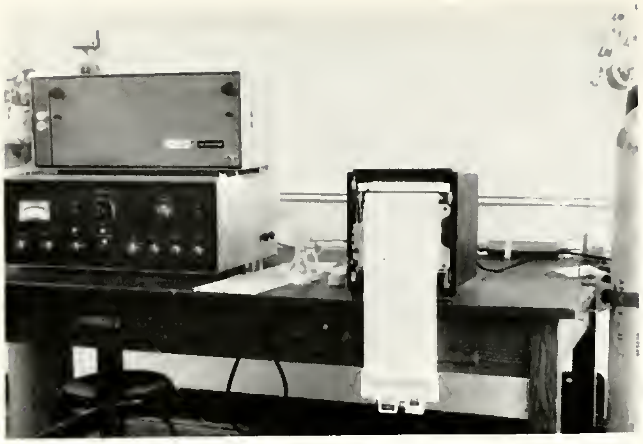
In previous reports, it has been shown how infrared radiation has been used to detect and identify unknown substances. Different compounds have their own characteristic infrared absorption pattern. This division uses an infrared spectrophotometer to measure and chart such a pattern. Still the amount of material required prohibits detection of some toxic materials.

Recently a gas chromatograph has been employed for further identification. The gas chromatographic technique is considered one of the most sensitive available. A micro amount of substance is injected onto one end of a narrow column of coated, granular firebrick. A flow of gas is then imposed at the same end of the column and is directed over the entire length of the column. As the firebrick is continuously flushed with gas, the injected sample moves slowly along the column in the same direction and its components separate and are discharged, one at a time, from the column end. A highly sensitive electronic device is employed to detect substances as they leave the column.

Since each component of a sample has a definite time during which it remains absorbed to the firebrick, the analyst can identify the unknown by observing the length of time it takes to travel through the column.

Because this method is so sensitive and eliminates so many interfering factors which would hinder chemical analysis, it has proven very successful in accomplishing the near impossible task of pesticide analysis. Such substances as endrin and related compounds are so slightly soluble in water that even a gallon sample would not have enough toxin in it to measure chemically or with infrared absorption. Using organic extraction and gas chromatography, the micro quantity of pesticide is easily detectable.

The infrared spectrophotometer helps identify hydrocarbon material in drilling muds.



The gas chromatograph is the most sensitive device available, providing analysis of trace material previously undetectable.

Gas chromatography also provides a high degree of versatility. It can be used to detect a multitude of organic substances never before attainable. For this reason, this division hopes to expand its use of chromatography to phenol analysis, oil analysis, and monitoring waterways in which some allowable complex amount of organic material is being discharged.

WATER QUALITY PROGRAM

The Water Quality Program, begun in 1958, is continuing to yield vital data that is available to the Stream Control Commission, industry, and the general public. To know the concentration of various chemical constituents is to promote the acquisition of land and to expedite the establishment of new industry. Existing industry also, being assured of a sufficient volume of good quality water, is inclined to expand production. The Stream Control Commission can act to issue discharge permits and other orders based on sound up-to-date information furnished by its Executive Secretary and his technical staff who participate in the Water Quality Program.

Municipalities, too, are concerned with the quality of water in our state. Drinking water obtained from our streams must meet rigid standards of purity for human welfare is indeed valuable. Water for domestic use before being pumped into the distribution system must first be treated. Water treatment is costly. Without precise information a municipal water treatment facility might spend enormous sums to reduce, remove, or sequester a prohibited element or compound from stream water before certifying it for human consumption.

Agricultural needs for good quality water must also be met. The rice farmer, for example, must rely on the water pollution control authority of his state to enforce laws regarding the purity of water. He must have clean water to irrigate his crop. Food processing industries must have clean water to prepare their products for market whether it be sweet potatoes, sugar cane, or cattle and hogs.

The general public in groups or as individuals who go fishing, camping, boating, swimming, and skiing in the water look upon the water quality program as good insurance against the theft or devaluation of a prime recreational resource.

Therefore, with these tremendous values in mind which are derived from one vital resource—clean water—it is with great pride that we report this sustained water quality program. One may be assured that through constant surveillance of our streams, they will neither be abused nor will the public interest be violated.

Throughout the state each month field representatives of the division collect forty-one water quality samples. The field men immediately make certain tests on the samples and send them to the Baton Rouge laboratory. The samples are grouped and analyzed for nine characteristics that indicate the degree of acceptance for the several uses mentioned previously. Tests are performed by experienced technical personnel using the most accurate techniques and apparatus available.

Sodium, for example, is determined by flame spectrophotometry. The spectrophotometer with power supply and photoelectric detector is used in conjunction with a falem accessory to obtain information of the highest precision and accuracy. An oxy-acetylene atomizer burner is used to excite the sodium atom or its oxide which limits measurable light energy with a wave length characteristic only of sodium. Per cent transmission of the light energy of a phototube is recorded and this is calibrated with concentrations (ppm) of sodium in standard solutions. In this way the concentration of sodium in the unknown samples can be detected whether it be three one thousandths of a gram per liter or three thousand parts per million.

Chloride is another constituent in which we as water quality authorities are interested. Chloride may be present in surface waters in combination with sodium, potassium, magnesium, calcium, and other elements. Chlorine is present in chlorinated hydrocarbons which are widely used as insecticides that, incidentally, have caused many fish kills. Residual chlorine may exist in polluted water, water treatment plant effluent, potable water in the distribution system, swimming pool water, and industrial process water. It may be present as free available chlorine (hypochlorous acid and hypochlorite ion) or as combined available chlorine (chloramines and other chloro derivatives). In the pollution control laboratory, chlorides are determined as mecurometric titration of a suitable aliquot using analytical reagent grade chemicals, volumetric pipettes and burets, automatic stirring devices and background illumination. The precision of this method is ± 1.3 mg/1. The formula for calculation is shown:

$$\text{mg/1 Cl} = \frac{\text{ml Hg }(HO_3)_2\text{ for sample—ml Hg }(NO_3)_2\text{ for Blank X Normality Hg}(NO_3)_2\text{ X }35{,}460}{\text{ml Sample}}$$

These two specific analyses are discussed to show the highly specialized knowledge and type of performance required to obtain reliable data on which the Stream Control Commission may act in the best interest of the state. At present these data are being made more readily accessible through the efforts of the Statistical Research Section. The chemical and physical facts are being prepared on punched cards where the values can be tabulated and sorted. With the introduction of this modern data processing method and equipment into the water quality program, an inquiring mind may in a very short time be able to peruse and assimilate facts and trends in water quality on a particular stream. Or he may study one characteristic over a period, or he may comapre one or more characteristic on several streams or stations at a given time. In short, whatever is of immediate interest may be given intensive study most readily and conclusions drawn more quickly.

In conclusion, the Water Quality Program is a major division project. It has provided a wealth of reliable data. Plans are to continue the program so that even the slightest abusive deterioration of our water quality may be checked.

OIL AND OYSTERS

About 13 per cent of complaints brought to the Commission by oyster farmers of the coastal waters is because of oily taste in oysters. Evidently for several years drilling muds bearing middle distillates were disposed of by contractural well service operation. These oil bearing muds lay dormant as the oil slowly leached out into the coastal waters; but the expanded operations in esturine waters now unavoidably churn the mud causing a more rapid dispersion of sediment and oil by lunor currents and tides, etc.

For many months the Commission has been sampling coastal muds more frequently in order to establish a mean concentration of hydrocarbons in specific oyster growing areas.

We have also been performing both the hydrocarbon analysis and the oily residue analysis on each sample in order to have comparative data by different methods. These data are compared to that obtained by using a field retort method. Through comparison and reduction of these three sets of data on many samples it is possible to ascertain the percentage of hydrocarbons present in each oily residue as well as the oily residue concentration in the mud.

Since the sampling and analysis of muds has become more frequent, we have acquired another semimicro heater and thermowell, more distillation flasks, and chromatographic equipment. We are now equipped to analyze five mud samples a week by two methods making a total of twenty mud analyses per month.

Individual complaints made by oyster farmers require the hydrocarbon determination on several samples from the affected oyster bed. These samples are given priority over the comparative basic data collection phase of the oil problem in coastal waters and muds. It is reasoned that this priority is justified because our primary function is to provide immediate relief followed by technical service and research to the oyster industry.

MOBILE LABORATORY UNITS

Our laboratory in Baton Rouge has long been in need of mobile field laboratories. These laboratories, two of which have become a reality during the past biennium, are enhancing the speed, quality, and effectiveness of biological and chemical studies of those water bodies of Louisiana not easily accessible to the staff and complete facilities of the main laboratory.

Water Pollution Control Division library stores current periodicals and permanently bound volumes,

The first unit was acquired from the Fish and Game Division of the Louisiana Wild Life and Fisheries Commission in January 1962. This unit, a twenty-six foot house trailer when first acquired, was completely reconditioned and remodeled; the end product being a mobile laboratory, adequately equipped for use in field survey work. This mobile laboratory was moved to Lake Charles where its facilities were used in gathering base line chemical, physical, and biological data on the waters of Calcasieu River and Calcasieu Lake. In September 1962 due to the resignation of the biologist assigned to this unit this much needed work was halted. It is hoped that with a replacement biologist the work in this growing industrial area can be resumed.

The second mobile laboratory unit was acquired from the U. S. Public Health Service, on a permanent loan basis, in August 1962. This unit, the more complete of the two, consists of a 28 foot trailer and a Dodge tractor. The tractor is being used to transport either of the mobile laboratories. This laboratory, equipped with lead lined sinks and counter tops, was rewired and replumbed; the refrigerator and hot water tank were replaced. In addition to being a fully equipped field laboratory, with facilities for twenty-six different chemical and physical analyses on water and the study of benthos (bottom dwelling) organisms, this air-conditioned laboratory also includes a desk, filing cabinet, and typewriter. In October 1962 this unit was moved to New Orleans and is presently located on the grounds of the New Orleans Levee Board Maintenance Shop, on the shore of Lake Pontchartrain.

The use of this laboratory has enabled the biologist in the New Orleans area to complete two water quality surveys in the past year, in addition to gathering cursory chemical and physical data on most of the water bodies in Orleans and surrounding parishes. Although the need for base line data in any water quality program cannot be denied, the need for effective abatement of existing pollution problems constituted a prime duty of the biologist in the New Orleans area during the past year. Some improvements have been made, some are still to be desired. The assistance rendered by personnel of the Coastal Waste Control Section of the Oysters, Water Bottoms, and Seafoods Division in these endeavors has been invaluable.

Future work planned in the New Orleans area includes:

1. Extension of the Missisipi River sampling program from Norco to a point below New Orleans.
2. Intensive gathering of base line data from those water bodies most likely to become recipients of industrial discharges in the near future.
3. Continued surveillance for abatement of existing pollution problems.
4. Assisting in aerial survey of offshore oil production facilities.

MISSISSIPPI RIVER SURVEY

The Mississippi River Survey has been continued along the lines of the same intensive water quality survey that it has since its inception in December of 1957. However its area has again been expanded to include the New Orleans to Head of Passes area. In addition to the water quality survey portion, the Emergency Warning Network and the Industrial Discharge Report sections have continued to function very efficiently. Several accidental spills of objectionable organic materials have occurred without downstream users experiencing any undue difficulty and several improvements in quality of industrial discharge have taken place.

Having compiled basic water quality data on the Mississippi River for six years, it is the feeling of personnel of the division that any present or potential industrial discharge of inorganic materials is a minor importance when compared to natural variation that occurs in the river. However, the same statement cannot be made about the present and potential discharge of organic materials, as minute traces of many of them are capable of causing objectionable taste and odor in domestic water supplies. Thus, with recent acquisition of gas chromatography equipment for detection of minute traces of organics, it is planned to place primary emphasis on organic pollutants in the Mississippi River.

PEARL RIVER SURVEY

The biological and chemical survey of the Pearl River was initiated in March 1961 and completed in August 1963. The area under study encompassed approximately thirty miles of the Pearl River, beginning about one mile above Bogalusa Creek (Control Station) and terminating at Waukiah Bluff. In addition to sampling in the river, extensive studies were made of the waste discharge of a large industry in Bogalusa.

Based on the data accumulated during the survey, the division released a report and several addenda. These indicate that the Pearl River is significantly affected as far downstream as Waukiah Bluff and grossly polluted from Bogalusa Creek to Pool's Bluff, some nine miles, by the discharge of wastes from a large industry in Bogalusa.

In conjunction with several hearings held by the Louisiana Stream Control Commission to consider the Pearl River, the offending industry submitted plans for a large waste treatment facility, which it is hoped will abate much of the pollution of the river. This treatment facility has been under construction since September 1963 and completion is anticipated in April 1964.

Another aspect of the Pearl River situation is the study made by the U. S. Public Health Service during the month of September 1962. The data and conclusions drawn from this study were essentially the same as those of the division. In addition to the study, the U. S. Public Health Service held a conference on the Pearl River in New Orleans, Louisiana, October 22, 1963. Among the conclusions of the conference were statements calling for maintenance of adequate dissolved oxygen levels in the river and installation of additional waste treatment facilities by municipalities and industries in Louisiana and Mississippi. Progress toward accomplishment of the desired goal is subject to review at a later date.

FISH KILLS

The Division of Water Pollution Control has again during the past two years investigated numerous fish kills attributable to both natural and man-made factors.

Most of the natural kills and several of those attributable to man's activities were caused by depletion of dissolved oxygen. In the natural kills most of the oxygen depletions have been brought about by plankton blooms or accumulation of plant detritis along with low water levels and high water temperatures. Most of the man-made oxygen depletions were caused by discharges of waste from food processing plants, particularly sweet potato canners, during the late summer and early fall.

Foremost among man's activities contributing to fish mortalities is the widespread use of insecticides, particularly the application for the cane borer control. Fortunately the kills from insecticides have been less numerous during the insecticide application season.

Louisiana continues to be plagued by sporadic kills during the cool water months. These kills show a rather consistent pattern that closely resembles that of the massive kill noted in the Atchafalaya system and the Mississippi River during the winter of 1960-1961. None of the subsequent kills have reached such massive proportions. However, there are two additional causes for concern that have been noted in other streams in the Florida Parishes as far east as the Pearl River: (1) the kills this year have been noted earlier in the year (mid-October vs. mid-November) and, (2) at higher water temperature (20°-22° vs. below 15°C).

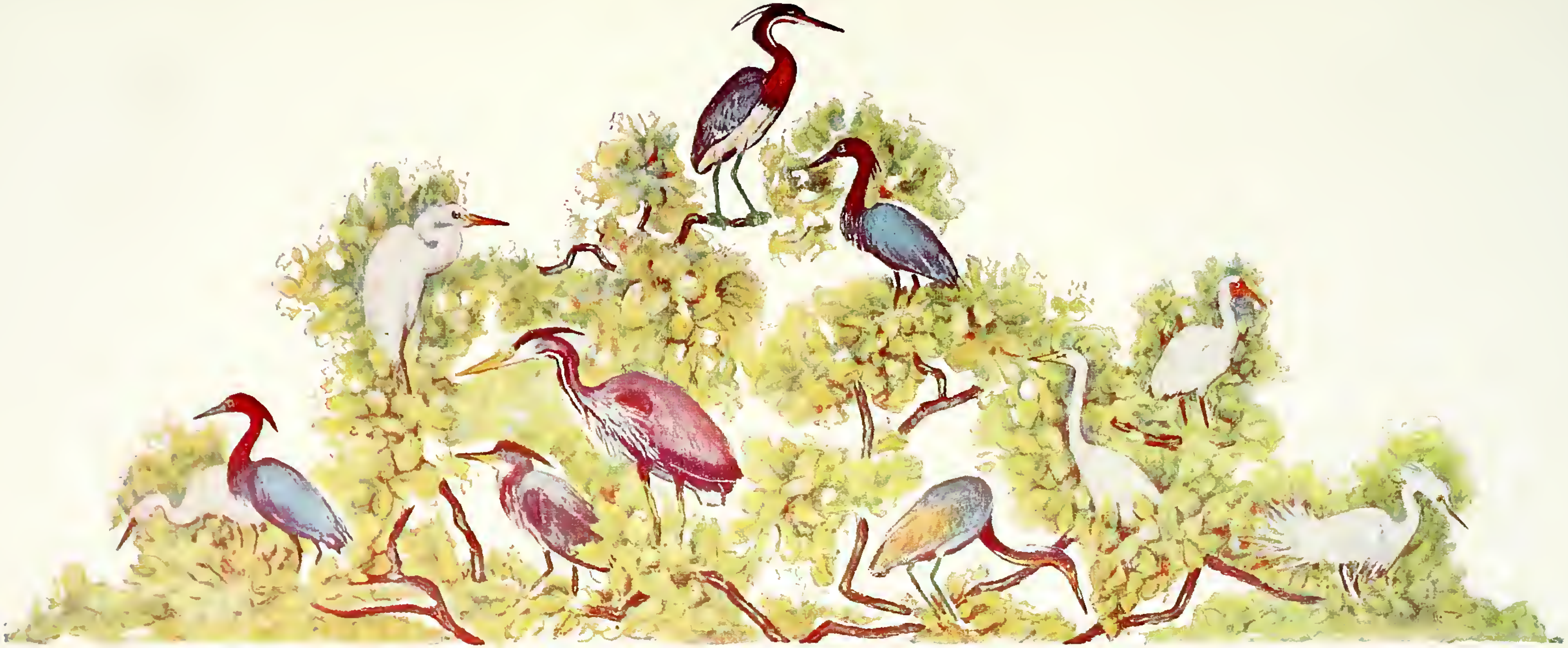
In addition to the running of analyses in the division laboratories, numerous samples of water, bottom muds, food organism, and fish have been sent to the following organizations: Robert A. Taft Sanitary Engineering Center, U. S. Public Health Service, Cincinnati, Ohio; Microbiological Laboratory, U. S. Fish and Wildlife Service, Kearneysville, West Virginia; Patuxent Research Center, U. S. Fish and Wildlife Service, Laurel, Maryland; and Fish Farming Experimental Station, Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service, Stuttgart, Arkansas. These materials, when analyzed in the various laboratories, have shown presence of insecticides at very low or even insignificant levels in a small percentage of the fish examined. In addition, bacteriological examination has disclosed presence of bacteria belonging to known pathological groups in some, but not all, of the fish. It is hoped that in the continued studies some definite evidence of the cause of these mortalities will be found.

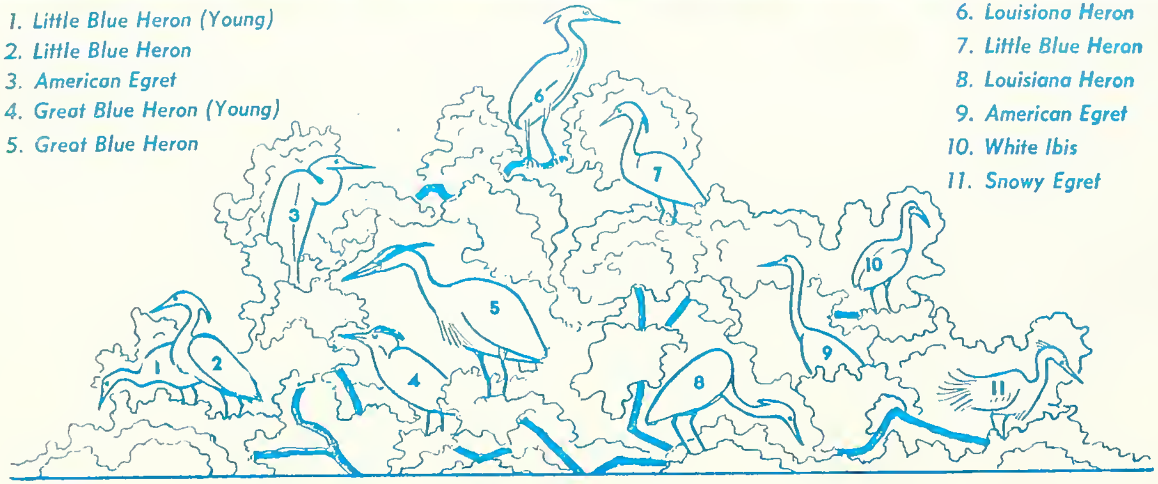
Additional minor kills have been noted that were due to thermal shock, toxic algae blooms, industrial discharge of toxic materials, and some easily discernable fish diseases. However, none of these have reached the alarming proportions of some of the kills attributed to insecticides or the widespread mortality of unknown origin.

LIBRARY FACILITIES

Rapid advance in science and technology have brought an increase in published literature on such subjects as water quality, chemical analyses, and bioassay. Recent scientific literature stresses the growing problem of information storage. Technical societies throughout the nation are setting up information centers through which knowledge may be catalogued and made available to scientists upon request. To stay familiar with all publications in any one field would require a full-time reading program which, of course, is impractical.

To keep information concerning water pollution in order, this division has set up a library to house subscribed journals, periodicals, and bound volumes which have been collected over the years. A collection of "The Journal of the Water Pollution Control Federation" has been kept current since 1940. Our subscription to "Analytical Chemistry" is continuous from 1940. Over a hundred bound volumes concerning subjects even remotely concerned with water pollution are available to our staff. All of this, plus additional space for future use, comprises the library of the Division of Water Pollution Control.





1. *Little Blue Heron (Young)*
2. *Little Blue Heron*
3. *American Egret*
4. *Great Blue Heron (Young)*
5. *Great Blue Heron*
6. *Louisiana Heron*
7. *Little Blue Heron*
8. *Louisiana Heron*
9. *American Egret*
10. *White Ibis*
11. *Snowy Egret*